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ABSTRACT

This curriculum for masonry is organized into 12 modules. Each module is comprised of two to nine competency statements. A student competency sheet provided for each competency is organized into this format: module and competency number and name, performance guide (for some competencies), learning activities, and an evaluation. Where appropriate, student quizzes, work sheets, and handouts are included. Titles of the modules include (1) Occupational Knowledge; (2) Leveling, Gaging, and Squaring; (3) Laying Basics; (4) Tooling and Pointing Joints; (5) Patterns; (6) Wall Construction; (7) Laying Columns; (8) Preparing Foundations and Footings; (9) Constructing Buildings; (10) Performing Miscellaneous Masonry Work; (11) Arches; and (12) Constructing Residential Chimneys and Fireplaces. A teacher's guide is available separately--see Note. (YLB)

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Student Material

MASONRY

Competency Based Education Curriculum

Prepared by:
Diana Long
RCA Education Service

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
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EDUCATION

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CE 028 957

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PREFACE

It is with great pleasure that we bring you another West Virginia competency based education (CBE) curriculum. This Masonry curriculum was developed for West Virginia under contract, by RCA Education Service. The effort was coordinated by staff of the Bureau of Vocational, Technical and Adult Education.

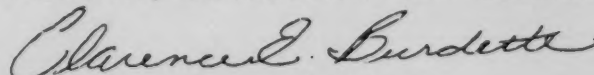
The Bureau began advocating CBE curricula in 1974. Since that time West Virginia has produced over 25 CBE curricula in various occupational areas. We also have a number of CBE curricula currently in the process of being developed and/or fieldtested.

This Masonry curriculum was inserviced and disseminated to West Virginia Masonry teachers at regional meetings during the spring of 1980. Additional copies of this curriculum are available from the:

Vocational Curriculum Laboratory
Cedar Lakes Conference Center
Ripley, West Virginia 25271
Telephone: 1-800-642-2670

I trust this material will be of assistance in your program. Any suggestions you may have for improving this curriculum may be sent to our State Curriculum Lab. Through this feedback we plan to continually update and revise our materials.

VOCATIONAL, TECHNICAL AND ADULT EDUCATION



Clarence E. Burdette
Assistant State Superintendent of Schools

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in the development of this CBE curriculum:

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Purpose of the
Masonry
Competency Based Education Curriculum

This competency based education (CBE) curriculum, with Teacher's Guide, has been developed so that you may adapt any or all of its contents to accommodate your teaching style.

The purpose of this CBE curriculum is to provide you and your advisory committee with a set of West Virginia-validated Masonry Tasks, along with (1) the Steps needed to perform each task, (2) the Evaluation Standards, and (3) suggested Learning Activities.

Depending on your teaching style, you may want to use this material primarily to assist you in your own teaching plans, or the material has been developed in enough detail so that it may, with proper supervision, be used by your students.

How you use this CBE curriculum is up to you. It has been based on the best Masonry information and material available in 1978-79 in West Virginia and the United States.

Student Competency Sheets

STUDENT COMPETENCY SHEET

MODULE 01

Occupational Knowledge

COMPETENCY 01

Describes working conditions and earnings common to masons.

LEARNING ACTIVITIES

1. Read the working conditions and earnings of bricklayers in the Occupational Outlook Handbook, (OOH). In the 1978-79 edition it is on pages 256-257. Answer the following questions.
 - 1) The OOH describes the job as strenuous - why?
 - 2) What is the hourly wage rates for bricklayers, stonemasons and marble setters?
 - 3) What wage can you expect to earn when you begin working?
 - 4) Explain the following:
"Yearly earnings for workers in these trades are lower than it seems."
2. Read Chapter 2 "Safety on the Job" in Masonry Simplified or Brick-laying Skill and Practices. They both begin on page 13. Be prepared to discuss the answers to the questions at the end of the chapter with a group of students and your instructor.
3. Listen to a guest lecturer from the local union discuss wages and working conditions. From the lecture, you should be able to answer the following:
 - 1) What is a scab?
 - 2) How do scabs affect union wages?
 - 3) What are the local wages per hour?
 - 4) What are the local wages per year?

EVALUATION

You must score 80% on the following Evaluation. You may not use references.

EVALUATION

01/01

Tell if the statements are true or false.

1. A mason will earn on the average of \$72.00 - \$76.00 a day.
2. One good thing about being a brick layer is that your work is not affected by the weather.
3. You have to be an apprentice before you can join the Bricklayers Union.
4. Since bricklayers only lift one brick at a time their work is not very strenuous.
5. You don't have to be in a union to work as a bricklayer.
6. The three main hazards while working on or under scaffolds are; falling, dropping tools or materials, and faulty scaffolding.
7. Masons only use scaffolds with wheels and the hanging scaffolds.
8. Masons should learn safety rules you should follow when you are working with chemicals.
9. Masons should have salt tablets near them in case of a burn.
10. Masons do not have rules set down for them by OSHA (Occupational Safety and Health Act).

STUDENT COMPETENCY SHEET

MODULE 01

Occupational Knowledge

COMPETENCY 02

Describes educational and technical requirements for masons..

LEARNING ACTIVITIES

1. Read page 256 "Training, Other Qualifications, and Advancement" in the 1978-79 Occupational Outlook Handbook. Be able to answer these questions:
 - a. What is an apprentice?
 - b. How old do you have to be before you can be an apprentice?
 - c. Do you have to be a high school graduate?
 - d. What courses in high school can help you be a bricklayer?
 - e. Can you be a bricklayer without serving an apprenticeship?
2. Contact your local bricklayers union to find out the answers to these questions.
 - a. How do you apply for an apprenticeship?
 - b. How many years of on-the-job training are necessary?
 - c. How many hours of classroom instruction?
 - d. What subjects are taught?
 - e. Describe the duties apprentices perform.
3. Contact a brickmason in your area and ask him or her how to get into the union. Compare their answer with the information given to you by the union.

EVALUATION

Report orally or in writing the educational and technical requirements for masonry jobs. Your report must include information on high school requirements, apprenticeship programs and how to get into the local union. You must use at least two different references.

STUDENT COMPETENCY SHEET

MODULE 01

Occupational Information

COMPETENCY 03

Describes employment outlook for masonry occupations.

LEARNING ACTIVITIES

1. Read the newspaper for job opportunities for one week. Make a list of the different jobs in your area for bricklayers. Make another list for jobs out of the area. Be sure and write down wages and any experience required.
2. Read "Employment Outlook" on page 256 in the Occupational Outlook Handbook. Discuss the following with your class.

"There is always plenty of work for a good mason."
3. Contact your local union to find out what problems you may have if you leave your area. Why is West Virginia a good/bad place for masons to live and work? Discuss your answers with your class.

EVALUATION

Report orally or in writing on the employment outlook for masonry jobs. You must use at least two references. Your report should include local, state, and national outlooks for the next five years.

STUDENT COMPETENCY SHEET

MODULE 02

Leveling, Gaging and Squaring

COMPETENCY 01

Gage masonry wall with mortar scale.

PERFORMANCE GUIDE

1. Gage first course 2-3/4 inches or on 6 using a spacing rule.
2. Gage second course 5-1/2 inches or 6.
3. Gage all additional courses on 6 up to 71-1/2 inches.
4. Beyond 71-1/2 inches high, all courses will remain on 6 until wall is completed.

LEARNING ACTIVITIES

1. Attend a lecture/demonstration by your instructor on using a folding rule and retractable steel tape. Be prepared to discuss the following.
 - a. When would a mason use a six foot folding rule?
 - b. When would a mason use a retractable steel tape?
2. Complete Student Handout 02/01/02 "Reading a Rule". When you are finished, have your instructor check your work. If it is satisfactory, go on to Learning Activity 3.
3. Read page 35 in Bricklaying Skill and Practice. Get a six foot folding rule from your instructor. Tell what type of brick you should be using if you use:
 - a. Scale 8
 - b. Scale 6
 - c. Scale 5
 - d. Scale 4
 - e. Scale 3
 - f. Scale 2
4. Measure the scales of five brick walls in your area. Identify the location of the wall, the scale and type of brick or block used.

EVALUATION

Given a brick wall, six foot folding rule and retractable steel tape you will gage the first, second, and all additional courses up to 71-1/2 inches. You must receive a satisfactory rating on all items of the Student Checklist.

STUDENT CHECKLIST

Satisfactory

Unsatisfactory

- 1) All errors identified
- 2) Used six foot folding rule correctly
- 3) Used retractable steel tape correctly

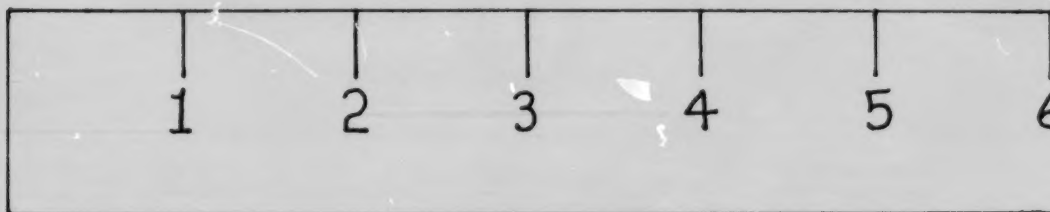
Student Handout

02/01/02

READING RULERS

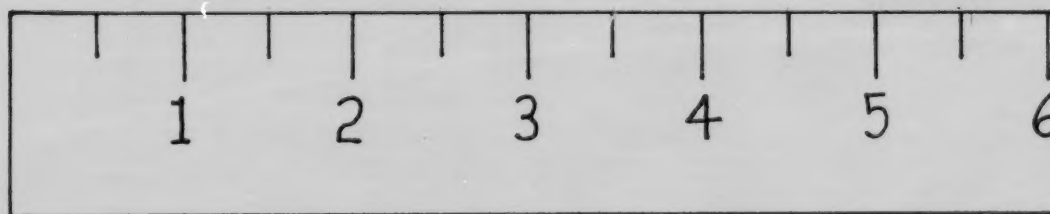
Rulers, folding rules, and retractable steel tapes are used as measuring devices. All are marked alike, in inches and in fractions of inches. If you can read a ruler, you can also read a folding rule or a steel tape.

The drawing below shows part of a ruler. The inches are marked with long lines and are numbered.



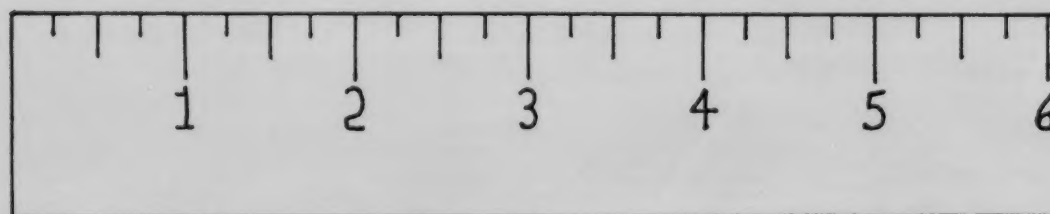
Find the inch marks on your ruler and practice measuring items in your classroom to the nearest inch.

Fractions (parts) of an inch are marked on the ruler by shorter lines. These marks are not numbered. The drawing below shows a ruler with the inch and the $\frac{1}{2}$ (half) inch marks.



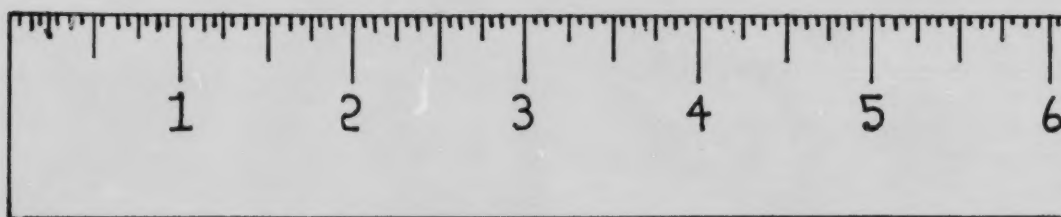
Find the $\frac{1}{2}$ inch marks on your ruler and practice measuring items in your classroom to the nearest $\frac{1}{2}$ inch.

The drawing of a ruler below shows the inch marks, the $\frac{1}{2}$ inch marks and the $\frac{1}{4}$ (quarter) inch marks. Note that there are four quarter inches to each inch.



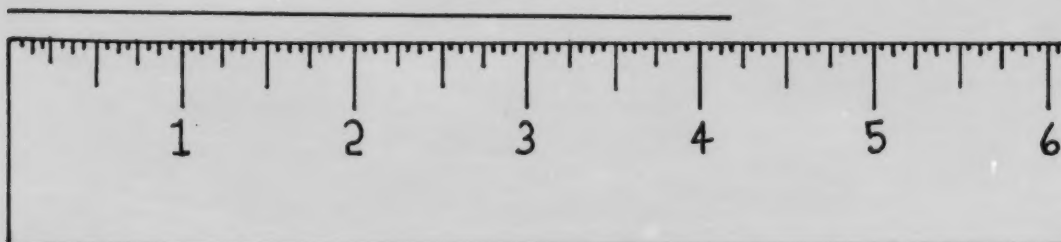
Find the $\frac{1}{4}$ inch marks on your ruler and practice measuring items in your classroom to the nearest $\frac{1}{4}$ inch.

The drawing below shows the inch marks, the $\frac{1}{2}$ inch marks, the $\frac{1}{4}$ inch marks, and the $\frac{1}{16}$ (sixteenth) inch marks. Thus, in each inch there are 16 short marks divided into groups of four by the $\frac{1}{4}$ and $\frac{1}{2}$ inch marks.



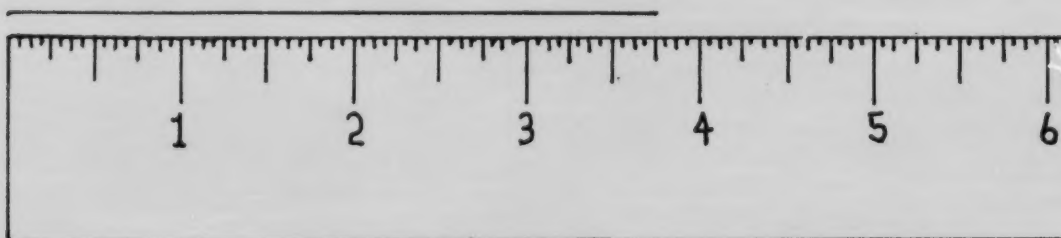
Read the ruler from the left, counting the number of whole inches. Write this down as a whole number. Then count the number of $\frac{1}{16}$ inch marks past that last whole inch.

EXAMPLE A:



In the drawing above, the line extends 4 whole inches and then goes on to the third $\frac{1}{16}$ " mark. This line measures $4 \frac{3}{16}$ ".

EXAMPLE B:



In this example, the line extends 3 whole inches, then goes on to the third $\frac{1}{4}$ " mark. This line measures $3 \frac{3}{4}$ ".

Following is a list of the possible fractions that can be found in one inch.

$1/16''$	$9/16''$
$2/16$ or $1/8''$	$10/16$ or $5/8''$
$3/16''$	$11/16''$
$4/16$ or $1/4''$	$12/16$ or $3/4''$
$5/16''$	$13/16''$
$6/16$ or $3/8''$	$14/16$ or $7/8''$
$7/16''$	$15/16''$
$8/16$ or $1/2''$	

Practice measuring items in your classroom until you can read the ruler accurately, then do the practice problems below.

PRACTICE PROBLEMS

Measure these lines to the nearest $1/16$ of an inch.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

STUDENT COMPETENCY SHEET

MODULE 02

Leveling, Gaging, and Squaring

COMPETENCY 02

Gage masonry wall with story pole.

PERFORMANCE GUIDE

1. Obtain piece of straight wood to serve as story pole.
2. Mark on story pole the selected gage to be used.
3. Place story pole at given position at the corner of wall.
4. Gage courses at marks on story pole.

LEARNING ACTIVITIES

1. Attend a lecture/demonstration by your instructor on making and using a story pole. In a small group identify times when you would use a story pole instead of a folding six foot rule.
2. Get the pieces of wood from your instructor you need for story poles. Gage each one for:
 - a. Scale 8
 - b. Scale 6
 - c. Scale 5
 - d. Scale 4
 - e. Scale 3
 - f. Scale 2
3. Use each of the story poles to gage walls. If you find any errors - check to make sure it is not your story pole.

EVALUATION

Given the necessary equipment you will make and gage a story pole for scale 8, scale 6 and scale 2. You may not use references. Your gage must be within + or - 1/8 of an inch.

STUDENT COMPETENCY SHEET

MODULE 02

Leveling, Gaging, and Squaring

COMPETENCY 03

Determine if surface is plumb, level and square.

PERFORMANCE GUIDE

1. Select level and square.
2. Check wall to make sure it is "plumb".
3. Check wall to make sure it is level horizontally.
4. Check to make sure corners are 90°.

LEARNING ACTIVITIES

1. Read pages 32 "Levels" and page 34 "Steel Square" in Bricklaying Skill and Practice. Answer the following questions without using your book.
 - a. What does "plumb" mean?
 - b. Why would a mason want a short level?
 - c. Why are there two bubble gages on a level?
 - d. When do you use a steel square?
 - e. Why do you use a steel square?
2. Attend a lecture/demonstration by your instructor on using a level. Take notes to make sure you know how to use a level:
 - a. as a straightedge
 - b. to check to see if a wall is plumb
 - c. to check to see if a horizontal surface is level.
3. Attend a lecture/demonstration by your instructor on using a square. Take notes to make sure you can use a square:
 - a. as a straight edge
 - b. as a ruler
 - c. to measure angles.
4. Practice using the square and level until you can read them within seconds. Your instructor will tell you which walls to use for practice. After you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given a brick wall, level and T square. You must measure to find out if the wall is plumb, square and level. You must receive a satisfactory rating on each item of the Student Checklist on the next page.

STUDENT CHECKLIST

Satisfactory

Unsatisfactory

1. Identifies "plumb" wall within five seconds using spirit level.
2. Identifies level wall within five seconds using spirit level.
3. Uses spirit level to check for spacing.
4. Identifies square wall using square.

STUDENT COMPETENCY SHEET

MODULE 03

Laying Basics

COMPETENCY 01

Cut a bat closure.

PERFORMANCE GUIDE

NOTE: For a bat closure, cut the brick perpendicular to the 8 inch side.

1. Wear eye protection.
2. Hold the brick firmly for cutting.
3. Score the brick on all four sides.
4. Strike the brick with a brick hammer or trowel where you want the brick to break.
5. Square the cut side with a hammer if the brick doesn't break clean.

LEARNING ACTIVITIES

1. Attend a lecture/demonstration by your instructor on safety procedures to use when cutting bricks. You must observe these safety rules at all times.
2. Read pages 52-55 in Masons and Builders Library and answer the following questions. When you are finished, check your answers with your instructor.
 - a. What is the name for the last brick placed in a course?
 - b. If a bat is a piece of brick with one end whole and the other end broken off - explain what a "Bat closure" means.
 - c. What does "score a brick for cutting" mean?
 - d. What kind of tools do you use to score brick?
3. Score sample bricks on all four sides for cutting so you will have a 3/4 bat closure, 1/2 bat closure and 1/4 bat closure. Check your work with your instructor.
4. Attend a lecture/demonstration by your instructor on breaking bricks. Take any notes necessary so you can correctly use a beveled chisel and hammer to cut and square a brick.
5. Following the Performance Guide, break the bricks you scored in Learning Activity 3. After you break each brick and it is clean and square, check your work with your instructor.

EVALUATION

Select the proper tools and cut a 1/2 bat closure, a 3/4 bat closure and 1/4 bat closure, You must receive a satisfactory rating of each item on the Student Checklist below. You may not use references.

STUDENT CHECKLIST

CUT A BAT CLOSURE

Satisfactory ☒ Unsatisfactory

1. Selected proper tools.
2. Observed safety rules.
3. Cut each bat closure perpendicular to 8 inch side.
4. Cut side squared when necessary.

STUDENT COMPETENCY SHEET

MODULE 03

Laying Basics

COMPETENCY 02

Cut a queen closure.

PERFORMANCE GUIDE

NOTE: Cut the brick parallel to the 8" side.

1. Wear eye protection.
2. Hold the brick firmly for cutting.
3. Score the brick on all four sides.
4. Strike the brick with a brick hammer or trowel where you want the brick to break.
5. Square the cut side with a hammer if the brick does not break clean.

LEARNING ACTIVITIES

1. Look up the definitions for queen closure in Masonry Simplified and Modern Masonry. Combine the definitions and write your own. Compare it with another student's definition. If there is any doubt of what "queen closure" means to you, ask your instructor.
2. On page 54 in the Masons and Builders Library you will find four sketches of common closures and corners. Be able to identify each type from a display furnished by your instructor.
3. Score a brick for a queen closure on all four sides. Check your work with your instructor. Make sure you use all safety rules.
4. Following the Performance Guide, cut a queen closure. If the brick does not break clean, square the sides with a hammer. Check your work with your instructor.

EVALUATION

Select the proper tools and cut a queen closure. You must receive a satisfactory rating on each item of the Student Checklist on the next page. You may not use references.

STUDENT CHECKLIST

CUT A QUEEN CLOSURE

Satisfactory

Unsatisfactory

1. Selected proper tools.
2. Observed safety rules.
3. Cut queen closure parallel
to the 8 inch side.
4. Cut side squared if necessary.

STUDENT COMPETENCY SHEET

MODULE 03

Laying Basics

COMPETENCY 03

Bond a wall.

PERFORMANCE GUIDE

1. Select brick.
2. Determine size of head joints.
3. Space bricks to given dimension.
4. Mark each head joint.
5. Remove brick and prepare to lay in mortar.

LEARNING ACTIVITIES

1. Read pages 7-15 in Modern Masonry. In a small group discuss.
 - a. The differences between soft mud process, stiff mud process and dry-press.
 - b. The differences between building bricks and facing bricks.
 - c. The most common brick sizes.
 - d. The differences between solid masonry units and hollow masonry bricks.
 - e. Conditions that affect the weather-ability of a brick.
 - f. Explain efflorescence and why it must occur.
 - g. Things that affect compressive strength.
2. Attend a lecture/demonstration by your instructor on "Bonds and Patterns". Take notes to make sure you can explain
 - a. structural bonds
 - b. pattern bonds
 - c. mortar bonds
3. Study page 18 in Modern Masonry until you can identify the six basic structure bonds. When you are ready, your instructor will give you a quiz on the bonds. Your answers must be 100% accurate.
4. Read pages 76-77 "Thickness of Mortar Joints" in Masonry Simplified and be able to specify the size mortar joints needed without using a reference.
5. Read pages 108-113 in Modern Masonry and take notes as your instructor demonstrates each step.
6. For each of the following specifications; select the brick, determine size of head joints, space brick and mark head joints. Check your work with your instructor before going on to the next specification.

	Height	Length
a.	1'	4'
b.	2'	5"
c.	3'	4 1/2'
d.	2 1/2'	7'
3.	3'	8'

EVALUATION

Get the necessary equipment and supplies and lay out a wall to be 2 ft. high and 5ft. long. Lay the first course with equal head joints in line where wall is to be laid.

STUDENT COMPETENCY SHEET

MODULE 03

Laying Basics

COMPETENCY 04

Mix mortar with power mixer.

PERFORMANCE GUIDE

1. Pour water into power mixer while mixer is operating.
2. Add 1/2 of the masonry sand to the water.
3. Empty mortar mix into sand and water in power mixer.
4. Add other 1/2 of sand to mix in power mixer.
5. Allow power mixer to mix the contents 3 to 5 minutes, until mortar and sand becomes one color.
6. Pour mixed mortar from power mixer into mortar box.

LEARNING ACTIVITIES

1. Read pages 50-65 in Bricklaying Skill and Practice, answer questions 6, and 8-13 on page 65. Discuss your answers with your class.
2. Attend a lecture by your instructor on the proportions to use when mixing mortars. Following the lecture, work the problems below for S Mortar (maximum amount). When you are finished, check your answers with your instructor.

	Cement	Lime	Sand
a.	5 lbs.		
b.		2 lbs.	
c.	3 lbs.		
d.		4 lbs.	
e.		1 lb.	
f.	2 lbs.		

3. Work the problems above for type M and N mortar. Check your answers with your instructor.
4. Study the formula for mixing type M, S, and N mortars until you have them memorized. Your instructor will quiz you on the information. You must score 100% on the quiz.

EVALUATION

Your instructor will tell you to mix either M, N, or S type mortar with a power mixer. You must receive a satisfactory rating on each item of the Student Checklist on the next page. You may not use references.

STUDENT CHECKLIST

	Satisfactory	Unsatisfactory
1. Used right amount of lime, cement and sand.		
2. Used right amounts of water.		
3. Power mixer used correctly.		
4. Observed safety precautions.		

STUDENT COMPETENCY SHEET

MODULE 03

Laying Basics

COMPETENCY 05

Lay a stretcher course.

PERFORMANCE GUIDE

1. Dry bond a stretcher course along chalk line.
2. Gage the head joints at 3/8 inch.
3. Bed up end bricks on 6.
4. Level and plumb end bricks.
5. Place a line from one end brick to the other.
6. Remove 3 bricks at a time and replace them in mortar.
7. Continue with the procedure in step 6 until all bricks are laid in mortar.

NOTE: All bricks must be laid plumb, level and straight with the line.

LEARNING ACTIVITIES

1. Read pages 66-71 in Bricklaying Skill and Practice. In your own words write out simple steps to follow when you are laying a stretcher course. Compare your steps with another student's. Make any changes you want. Check your steps with your instructor.
2. Read pages 106-108 in Modern Masonry. Get a trowel from your instructor and practice the methods of loading a trowel until you feel comfortable with one of the three methods.
3. Follow your steps you wrote in Learning Activity 1 and the Performance Guide above. Lay a stretcher course three feet long. Check with your instructor after each step. Be sure and use the level to check to see if the bricks are plumb, level and straight.
4. Add three stretcher courses of brick onto the course of bricks you laid in Learning Activity 3. Check with your instructor when you need help. After you are finished have your instructor check your work to make sure it is plumb, level and straight.
5. Attend a lecture by your instructor on the differences between laying brick and block in a stretcher course. After the lecture, practice laying bricks and block in a stretcher course until you are ready for the Evaluation.

EVALUATION

Given the necessary equipment and supplies you will lay a stretcher course three feet long and three courses high. You may not use references. You must receive a satisfactory rating on each item of the Student Checklist below.

STUDENT CHECKLIST

Satisfactory

Unsatisfactory

1. Used all equipment correctly.

2. Stretcher laid plumb.

3. Stretcher laid level.

4. Joint joints within 1/8 inch.

STUDENT COMPETENCY SHEET

MODULE 03

Laying Basics

COMPETENCY 06

Lay a header course (full).

PERFORMANCE GUIDE

1. Cut 4 six inch pieces.
2. Dry bond full header course to given dimensions.
3. Square and mark each corner.
4. Remove all bricks.
5. Set 4 six inch pieces on desired course.
6. Lay full header course flat across the wall.

LEARNING ACTIVITIES

1. Read page 70 in Bricklaying Skills and Practice and be prepared to discuss the following:
 - a. When do you use header course?
 - b. What is different between laying stretcher and header courses?
2. Attend a lecture/demonstration by your instructor on laying a header course. From the lecture write in your own words the steps to use in laying a header course.
3. Follow the Performance Guide above and your steps you outlined in Learning Activity 2. Lay a header course. Check with your instructor after each step.
4. Attend a lecture by your instructor on the differences between laying brick and block in a full header course. Be prepared to pass a quiz on the information.
5. Practice laying header courses without using references. Check with your instructor where you need help. Make sure your course is plumb, level and straight. When you are ready, ask your instructor for the Evaluation.

EVALUATION

Given the necessary equipment and supplies, you will lay a header course using four six inch pieces on a prepared stretcher course. You may not use references and you must receive a satisfactory rating on each item of the Student Checklist on the next page.

STUDENT CHECKLIST

Satisfactory

Unsatisfactory

1. Used all equipment correctly.
2. Course laid plumb.
3. Course laid level.
4. Joints within $3/8$ to $1/2$ inch.
5. Cleaned and stored equipment properly.

STUDENT COMPETENCY SHEET

MODULE 03Laying BricksCOMPETENCY 07Lay corners.PERFORMANCE GUIDE

1. Form a 90 degree angle on the floor.
2. Dry bond the corner out to 6 bricks and 5 bricks to form a 90 degree angle.
3. Bed up corner brick on the 6 brick side on the prescribed scale.
4. Level and plumb corner brick.
5. Bed up brick 6, level from corner brick to brick 6 and plumb brick 6.
6. Remove brick 2 through 5 and replace them in mortar.
7. Level and straight edge the bricks.
8. Bed up brick 5, level from corner brick to brick 5 and plumb brick 5.
9. Repeat steps 6 and 7 to complete side.
10. Check and re-square corner if needed.
11. Establish bond pattern on both sides.
12. Complete desired height of additional courses by following steps 3, 4 and 5.

LEARNING ACTIVITIES

1. Read pages 108-112 in Modern Masonry and answer the following questions
 - a. Why do you use a chalk line?
 - b. Explain the "6-8-10 rule."
 - c. Why do you dry bond the bricks?
 - d. What does "tailing-out" mean?
 - e. Which do you plumb first, the corner brick or tail end?
 - f. When you use the level as a straight edge, do you have to use the bubbles?
 - g. What is the "rack of the lead?"
 - h. How do you measure the rack?
2. Define the following terms. Check your answers with your instructor.
 - a. wind
 - b. belly
 - c. cave in

3. Attend a lecture demonstration by your instructor on "Laying lead corners." Take any notes you feel are necessary.
4. Follow the Performance Guide above and lay a corner. Check with your instructor after each step. If your work is not satisfactory, do not go on until you correct the problem.
5. Practice laying corners on the six without using any written references. Check with your instructor when you need help. Your instructor will check corner to see if it is plumb, level, straight, and properly spaced.
6. Attend a lecture/demonstration by your instructor on laying corners with block. After the lecture, practice laying block corners until you feel ready for the Evaluation.

EVALUATION

Given necessary equipment, tools, and supplies you will lay a corner seven brick high, five brick long. You may not use references and the corner must be square, level, plumb, straightedged and all courses laid on 6.

STUDENT COMPETENCY SHEET

MODULE 04

Tooling and Pointing Joints

COMPETENCY 01

Tool concave joints.

PERFORMANCE GUIDE

1. Select concave jointer to be used.
2. Test mortar to see if it is ready to be jointed.
3. Strike head joints from bottom of the wall up with head jointer (short concave).
4. Strike bed joints from bottom of the wall up with sled runner by pushing along the wall with curved portion up front.
5. Fill and finish cracks or holes in joints.
6. Brush, rejoint and clean all joints.

LEARNING ACTIVITIES

1. Read pages 73-74 "Joint Finishing" in Bricklaying Skill and Practice. Be prepared to discuss the answers to the following questions during a class discussion.
 - a. List two reasons for tooling or jointing.
 - b. What is the test to tell if the mortar has set long enough.
 - c. What happens if you tool the joint too tight.
 - d. What does "concave" mean? convex?
 - e. How do you decide what size tool tip to use?
2. Attend a lecture/demonstration by your instructor on "testing mortar". After the demonstration, your instructor will quiz you on testing mortar. You must score 100% on the quiz.
3. Attend a lecture/demonstration by your instructor on tooling concave, convex & V joints. Take notes to make sure you know how to
 - a. Select the right jointer.
 - b. Strike head joints.
 - c. Strike bed joints.
 - d. Fill & finish cracks and joints.
 - e. Brush, rejoint and clean joints.
4. Follow the Performance Guide above and practice tooling concave and convex joints. Check with your instructor after steps 3, 4, and 5. When you are ready ask your instructor for the Evaluation.

EVALUATION

Given the tools, supplies and specifications you will tool concave, convex, and V joints. You may not use references. All joints must be uniform and smooth with no double imprints.

STUDENT COMPETENCY SHEET

MODULE 04

Tooling and Pointing Joints

COMPETENCY 02

Tool rake joints.

PERFORMANCE GUIDE

1. Adjust rake jointer to specified depth.
2. Test mortar to be sure it is hard enough not to smear.
3. Strike head joints from the bottom of the wall up with rake jointer.
4. Strike bed joints from bottom of the wall up with rake jointer.
5. Brush, rejoin and clean all joints.

LEARNING ACTIVITIES

1. Attend a lecture/demonstration by your instructor on tooling rake joints. Take notes to make sure you know:
 - a. how to adjust rake jointer.
 - b. how to test mortar for hardness.
 - c. how to strike bed and head joints.
 - d. the purposes of tooling rake joints.
 - e. advantages and disadvantages of rake joints.
2. Take a quiz on the above information. You must score 100%.
3. Follow the Performance Guide above and practice tooling rake joints. Check with your instructor after each step. When you can tool rake joints without using references, ask your instructor for the Evaluation.

EVALUATION

You will be given the necessary equipment, tools, supplies and specifications. Tool rake joints without using references. All joints must be uniformly raked, smooth, clean, free of holes and to the depth stated and the specifications.

STUDENT COMPETENCY SHEET

MODULE 04

Tooling and Pointing Joints

COMPETENCY 03

Tool squeeze joints.

PERFORMANCE GUIDE

1. Select solid bricks to be used for squeeze joints.
2. Butter bricks with full head joints.
3. Shove head joints together without cutting off excess mortar.
4. Press brick down to line without cutting off excess mortar.

LEARNING ACTIVITIES

1. Attend a lecture/demonstration by your instructor on tooling squeeze joints. Take notes to make sure you know:
 - a. how to select bricks
 - b. how to butter bricks
 - c. how to shove the bricks together
 - d. correct amounts of mortar to use
 - e. purposes of squeeze joints
 - f. advantages and disadvantages of squeeze joints
2. Take a quiz on the above information. You must score 100%.
3. Follow the Performance Guide above and practice tooling squeeze joints. Check with your instructor after each step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

Given the necessary equipment, tools, and supplies, you will tool squeeze joints. All bricks must be level with squeezed mortar appearing on all joints.

STUDENT COMPETENCY SHEET

MODULE 04

Tooling and Pointing Joints

COMPETENCY 04

Point a wall.

PERFORMANCE GUIDE

1. Stand back from the wall and observe for cracks and holes.
2. Chisel cracks where necessary.
3. Wet cracks after chiseling.
4. Place mortar in cracks and holes by using pointing trowel and tuck pointer, then brush.
5. Refinish joints by matching previous jointing.

LEARNING ACTIVITIES

1. Read pages 127-128 in Bricklaying Skill and Practice. Be prepared to answer the following:
 - a. Describe the first step in pointing.
 - b. Why would you use water when pointing?
 - c. Define "prehydrate". And explain why it is important in pointing walls.
2. Attend a lecture/demonstration by your instructor on how to use the following tools.
 - a. pointing trowel
 - b. tuck pointer
 - c. chisels
 - d. masonry brush

Your instructor will quiz you on how to use each of the tools when pointing. You must score 100%.

3. Read page 244 in Masons and Builders Library "Mortar for Tuck Pointing". Practice mixing the mortar until you can mix it correctly.
4. Attend a lecture/demonstration by your instructor on pointing new walls and repointing old walls. Take notes on each of the major steps to follow. Be prepared to explain the difference between pointing old and new walls.

5. Follow the Performance Guide above and your notes from the lecture and practice pointing a wall. Check with your instructor after each major step. When you can point a wall without using references, ask your instructor for the Evaluation.

EVALUATION

Given the necessary equipment, you will point a wall. All of the joints must be full and finished. Bond must hold between old and new mortar. You must use the tools correctly, and you may not use references.

STUDENT COMPETENCY SHEET

MODULE 05

Patterns

COMPETENCY 01

Lay rowlock, sailor, shiner, and soldier courses.

PERFORMANCE GUIDE

1. Scale course to determine number of bricks required for course.
2. Apply mortar to edges of brick to be laid.
3. Place brick on edge with 2- 1/4" and 4" end facing out.
4. Continue with process until course is complete.
5. Point and joint course.

NOTE: The sailor, shiner and soldier course may be laid, using the same process with the following position changes:

Sailor course - lay brick on end with 4" x 8" side facing out.

Shiner course - lay brick on edge with 4" x 8" side facing out.

Soldier course - lay brick on end with 2-1/4" x 8 side facing out.

LEARNING ACTIVITIES

1. Study the drawings of the course for rowlock, sailor, shiner, and soldier. Dry bond each of the courses until you can identify each course quickly. When you are ready your instructor will quiz you on the information. You must receive 100% on the quiz.
2. Study the chart on page 60 in Masons and Builders Library. Scale course your instructor has set up to find out how many bricks you will need if you were laying.
 - a. Rowlock
 - b. Sailor
 - c. Shiner
 - d. Soldier

Check your answers with your instructor. You must show your work.

3. Practice laying rowlock courses following the Performance Guide above. Check your work with your instructor after each step until you can lay a rowlock course without using references. Clean and store your tools and materials properly.
4. Practice laying sailor course.
5. Practice laying shiner course.
6. Practice laying soldier course.

EVALUATION

Given the dimensions of a course and the tools and supplies, you will lay a rowlock, sailor, shiner and soldier course. You may not use references and the course must be straight and level with no holes or cracks and the joints must be smooth and waterproof.

STUDENT COMPETENCY SHEET

MODULE 05

Patterns

COMPETENCY 02

Lay common bond pattern.

PERFORMANCE GUIDE

1. Lay the bond out dry.
2. Lay first course brick in mortar with veneer bond and on 6 using brick spacing rule.
3. Level and square the first course.
4. Cut 4 six inch pieces.
5. Bed 6 inch piece on each corner on 6.
6. Lay full headers between 6 inch pieces.
7. Level and plumb header course.
 - a. Plumb each jam or corner.
 - b. Plumb the face side of each corner.
 - c. Straight edge the face and kiln side of wall.
8. Lay 5 courses of the veneer bond.
9. Repeat steps 4 through 8.
10. All work must be ranged, jointed and pointed.

LEARNING ACTIVITIES

1. Read pages 15-18 in Modern Masonry. Study the drawings and the description of the common or American Bond until you can identify it and verbally describe the bond. When you are ready your instructor will quiz you. You must score 100% on the quiz.
2. Attend a lecture by your instructor on laying bonds. Make sure you know the answers to the following:
 - a. What does veneer bond mean?
 - b. How do you determine what courses to lay headers?
 - c. Define "jam".
 - d. Define "face" and "kiln" side of wall.
 - e. Define "ranged."
3. Follow the instructions on pages 113-114 in Modern Masonry. After each major step check your work with your instructor.
4. Follow the Performance Guide and practice laying a common bond pattern. Check with your instructor after each step. When you can lay the common bond without using references ask your instructor for the Evaluation.

EVALUATION

Given the specifications and access to equipment and supplies you will lay an American or common bond. You may not use references and you must score a satisfactory on each item of the Student Checklist.

STUDENT CHECKLIST

	Satisfactory	Unsatisfactory
1. Selects proper tools.		
2. Walls gauged correctly.		
3. Full headers laid according to specifications.		
4. Wall level and plumbed.		
5. Jointed and pointed.		
6. Tools and equipment cleaned and stored.		

STUDENT COMPETENCY SHEET

MODULE 05

Patterns

COMPETENCY 03

Lay a Flemish bond pattern..

PERFORMANCE GUIDE

1. Square and mark desired position for pattern.
2. Lay dry bond a full header across the wall on each corner.
3. Lay stretcher next to header within desired pattern position.
4. Alternate full headers and stretchers to opposite end.
5. Fill in stretchers on opposite side of wall.
6. Bed up first course in mortar.
7. Level, straight edge and check for squareness.
8. Cut 4 six inch pieces.
9. Lay six inch pieces in mortar on each corner.
10. Lay full header next to six inch piece.
11. Lay stretcher next to header and alternate to opposite end.
12. Level, plumb, straight edge, range and tool work.
13. Repeat steps 3 through 12 to desired dimensions.

LEARNING ACTIVITIES

1. Look at the picture of a Flemish bond on page 16 of Modern Masonry. From the picture write in your own words how you can tell a Flemish bond when you see one. Compare your answer with the definition in the glossary.
2. Study Figure 8-30 on page 116 in Modern Masonry. Describe in your own words what the text means by "Corner layout in Flemish bond with 3/4 and 1/4 closure." Be prepared to discuss your answers in a group discussion.
3. Attend a lecture/demonstration by your instructor on laying a Flemish bond pattern. Take notes on the different steps shown to you.
4. Use the Performance Guide above and your notes from the lecture and practice laying a Flemish bond pattern. Your instructor will give you the dimensions you need. Check with your instructor after each major step. When you can lay the pattern without using references, ask your instructor for the Evaluation.

EVALUATION

Given the necessary supplies, equipment, tools and building specifications you will lay an 8 inch Flemish bond pattern, using Dutch corners. Pattern must be level, plumb, straight edged, ranged and tooled according to specifications.

STUDENT COMPETENCY SHEET

MODULE 05

Patterns

COMPETENCY 04

Lay a stack bond pattern.

PERFORMANCE GUIDE

1. Scale work for stack bond pattern.
2. Apply mortar to brick.
3. Place brick in position with 4" x 8" side down.
4. Continue process until course is complete.
5. Point and joint course.
6. Lay succeeding courses until pattern is complete.

NOTE: Reinforce pattern according to specifications.

LEARNING ACTIVITIES

1. Read pages 19-20 "Block or Stack Bond" in Modern Masonry and study the pictures of stack bonds in Fig. 1-21; Fig. 1-25 and Fig. 1-26. Be prepared to discuss the advantages and disadvantages of using a stack bond during a class discussion.
2. Attend a lecture/demonstration by your instructor on laying stack bonds. Take notes to make sure you know
 - a. how to figure out how many bricks you will need for job.
 - b. how to reinforce the pattern.
3. Practice laying a stack bond pattern using the Performance Guide above. Check with your instructor after each major step. When you can lay a stack bond without using references, ask your instructor for the Evaluation.

EVALUATION

You will be given the supplies and equipment you need to lay a stack bond pattern. Lay the pattern without using references. The pattern must be plumb, straight and level with no holes or cracks. The vertical joint must be aligned, smooth and waterproof. The bricks cannot overlap.

STUDENT COMPETENCY SHEET

MODULE 05

Patterns

COMPETENCY 05

Lay a diamond pattern.

PERFORMANCE GUIDE

1. Lay out bond dry.
2. Lay first course of brick with Flemish bond on 6 using spacing rule.
3. Level and square the first course.
4. Cut 4 six inch pieces.
5. Lay 6 inch pieces on each corner on 6's.
6. Level 6 inch pieces and stretcher course.
7. Plumb each corner and jam.
8. Plumb the face of each corner.
9. Straight edge the face and kiln side of the wall.
10. Lay stretcher courses between 6 inch pieces.
11. Level and repeat steps 6, 7 and 8.
12. Lay a header on each corner of the third course on 6.
13. Lay 4 stretchers and center 1 header between the 4 stretchers.
14. Level and repeat steps 6, 7 and 8.
15. Cut 2 closures and lay them on each end of the 4th course.
16. Lay stretcher course between closures.
17. Level and repeat steps 6, 7 and 8.
18. Lay 2 whole bricks on each corner of the 4th course.
19. Lay 1 stretcher and 1 header after the 2 whole bricks.
20. Lay 3 stretchers to finish 5th course.
21. Continue to lay a diamond pattern in the wall by following the previous steps, (2-19).

LEARNING ACTIVITIES

1. Read pages 171-173 in Masons and Builders Library and answer the following.
 - a. In your own words, describe how the units are laid.
 - b. What is meant by "they always present exact mathematical proportions to each other".
 - c. Odd number units are always composed of _____.
 - d. Even number units always carry one _____ as near their center as possible.
 - e. Why are horizontal and vertical borders important?
 - f. Explain in your own words this statement "In order to be symetric vertically the panel must always have an odd number of courses."

2. Sketch diamond patterns to meet the following building specifications. You may have more than one diamond in the total structure.
 - a. 6 courses high 4 feet long.
 - b. 12 courses high 8 feet long
 - c. 60 courses high 12 feet long.

Compare your designs with the class.

3. Attend a lecture/demonstration by your instructor on laying a diamond pattern. Take notes and write in your own words the major steps to follow.
4. Practice laying diamond patterns using the Performance Guide above and your notes from the lecture. Check with your instructor after you complete each major step. When you can lay a diamond pattern using only building specifications, ask your instructor for the Evaluation.

EVALUATION

You will be give the necessary supplies, tools and equipment. You will lay an 8 inch diamond pattern without using references. The wall must be laid on 6 or 4 or 11 with closure occuring every 4th course when opening the diamond. Stretchers must be used every 4th course when you close the diamond. The wall must be level, plumb, straight-edged, ranged, jointed and free of cracks and holes.

STUDENT COMPETENCY SHEET

MODULE 05

Patterns

COMPETENCY 06

Lay a herringbone bond pattern.

PERFORMANCE GUIDE

1. Cut two 2-3/4 inch and two 5-1/2 inch combination pieces.
2. Bevel whole brick on corners.
3. Determine center of pattern.
4. Dry bond the pattern.
5. Bed up first section of pattern using 2-3/4 inch pieces as starter and 5-1/2 inch pieces as next unit.
6. Bevel the end of whole brick to end at the top of 5-3/4 inch piece.
7. Place whole brick across 5-3/4 inch piece and beveled brick.
8. Repeat steps 5, 6 and 7 to the end of herringbone pattern.
9. Square dimensions of desired pattern area.

LEARNING ACTIVITIES

1. Study the patterns on pages 176, 177, 185, 189 in The Art of Bricklaying. From the pictures, write down how you can identify a herringbone bond pattern. Compare your answer with the definition in the glossary.
2. Sketch the following herringbone patterns.
 - a. Oblique herringbone
 - b. Herringbone bond
 - c. Square herringbone
3. Attend a lecture/demonstration by your instructor on laying herringbone bond patterns. Take notes so you can identify the major steps in laying the pattern.
4. Practice laying herringbone bond patterns following the Performance Guide above and your notes from the lecture. Your instructor will give you building specifications. Check with your instructor after each major step. When you can lay a pattern without using references, ask your instructor for the Evaluation.

EVALUATION

Given the necessary tools, supplies, and building specifications you will lay a herringbone pattern without using references. All bricks must be laid at 45° angle with the appearance of a "W" or "M".

STUDENT COMPETENCY SHEET

MODULE 05

Patterns

COMPETENCY 07

Lay a basket weave pattern.

PERFORMANCE GUIDE

1. Determine type of brick to use.
2. Prepare area to be laid in a bed of mortar or grout.
3. Lay bricks according to basket weave pattern.
 - a. Lay off in 8 inch pattern.
 - b. Use a line to lay all brick over 48 inches.
 - c. Check pattern with level or straight edge to assure levelness.
 - d. Joint and point all brick.

LEARNING ACTIVITIES

1. Study the drawings of diagonal basket weave and basket weave on page 46 in Modern Masonry. Identify at least one building in your area which uses the basket weave pattern.
2. Attend a lecture/demonstration by your instructor on laying a basket weave pattern. Take notes to make sure you know
 - a. how to compute the number of bricks needed.
 - b. definition of grout.
 - c. how to lay corners in basket weave patterns; and diagonal basket weave.
 - d. how to gauge the courses.
 - e. how to lay the first course for basket weave and diagonal basket weave.
3. Take a quiz on the above information. You must score 100%.
4. See your instructor for course specification and practice laying a basket weave pattern, using the Performance Guide above. Check with your instructor after each step. When you can lay both the basket weave and diagonal basket weave patterns without using the Performance Guide ask your instructor for the Evaluation.

EVALUATION

Given an area, equipment and supplies, you will lay a basket weave pattern without using references. All joints must be uniform and the area must be plumb and level.

STUDENT COMPETENCY SHEET

MODULE 06

Wall Construction.

COMPETENCY 01

Reinforce brick masonry.

PERFORMANCE GUIDE

1. Select wire for size of wall being built.
2. Place wire in center of wall, horizontally, 16 inches in center.
3. Overlap each adjoining section of wire.
4. Bend wire around each corner.
5. Extend wire for adjoining walls.

LEARNING ACTIVITIES

1. Read Chapter 5 in Modern Masonry and answer the review questions at the end of the chapter. Discuss your answers in a small group. Make any necessary changes.
2. Attend a lecture/demonstration by your instructor on reinforcing rods. During the lecture take notes on the size of the rod and what size wall it is used with. You must pass a quiz (100%) by correctly matching the rod to its number or the number to the correct rod, and describing the size wall it would reinforce.
3. Attend a lecture/demonstration by your instructor on reinforcing brick masonry. Take notes on the steps you should follow. From the lecture answer the following questions.
 - a. What is grout? When do you use it? How do you mix it?
 - b. If you have brick faces holding the rods - do you lay any extra mortar?
 - c. How thick should the mortar bed be?
 - d. Define transverse and vertical rods.
 - e. How do you treat corners?
4. Using your notes and the Performance Guide above, practice reinforcing brick masonry. Check with your instructor after each major step. When you are ready ask your instructor for the Evaluation.

EVALUATION

You will be given the specifications, tools and supplies. Select the size wire and reinforce the masonry. The wire must be placed horizontally 16 inches on center and must not be exposed to the face of the wall. You may not use references.

STUDENT COMPETENCY SHEET

MODULE 06

Wall Construction

COMPETENCY 02

Construct brick veneer wall.

PERFORMANCE GUIDE

1. Determine type of brick to be used.
2. Bond the wall.
3. Scale each course.
4. Lay brick in mortar to scale.
5. Secure wall with ties at desired intervals.
6. Point and joint the wall.

LEARNING ACTIVITIES

1. Read pages 88-92 in Masons and Builders Library and answer the following questions.
 - a. Describe a "veneer wall".
 - b. What are the two ways of putting up a veneer wall?
 - c. Why is it important that the metal ties be "corrosion resistant"?
 - d. What is a vibration joint?
 - e. Describe 2 different ways of putting in vibration joints.
 - f. How much air space do you leave between the brick and sheathing if you are using metal tabs? wire mesh?
 - g. What are weep holes? Why are they important?
2. Attend a lecture/demonstration by your instructor on reading blueprints to lay a veneer wall.
3. Using the Performance Guide above, practice laying a veneer wall according to blueprint specifications. Check with your instructor after each major step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given blueprint specifications for a veneer wall. Lay the wall. The wall must be plumb, straight, level and free of cracks and holes. Wall must have 1 inch air space between sheathing and brick. You may not use any additional references.

STUDENT COMPETENCY SHEET

MODULE 06

Wall Construction

COMPETENCY 03

Construct cavity wall.

PERFORMANCE GUIDE

1. Determine width of cavity and type of brick to be used.
2. Bond the wall, allowing for cavity.
3. Scale each course to desired height.
4. Lay brick in mortar to scale.
5. Secure wall with ties at desired intervals.
6. Point and joint the wall.

LEARNING ACTIVITIES

1. In your own words-define a cavity wall. Compare your answer with the definition in Modern Masonry.
2. Read pages 173-174 in Bricklaying Skill and Practice and pages 138-139 in Modern Masonry. Answer the following questions.
 - a. Define "wythes"
 - b. What is the usual size of the cavity?
 - c. What are the advantages of using a cavity wall? Disadvantages?
 - d. Where do you put reinforcements?
 - e. What restrictions are put on the size of cavity walls?
 - f. How can you keep the cavity clear while you are laying the wall.

Discuss your answers in a class discussion.
3. Attend a lecture/demonstration by your instructor on laying a cavity wall. Take any notes and identify the major steps to follow.
4. Using your notes and the Performance Guide above, practice laying cavity walls. See your instructor for the specific size. Check with your instructor after each major step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the necessary equipment and supplies and specifications. Lay a cavity wall. The cavity should not be less than 2" nor more than 3" wide. The wall must be plumb, level, straight and free of cracks and holes. The cavity must be free of mortar droppings. You may not use references.

STUDENT COMPETENCY SHEET

MODULE 06

Wall Construction

COMPETENCY 04

Form a corbel.

PERFORMANCE GUIDE

1. Define the total projection (how far the final projection comes out from the wall).
2. Determine how much each projection should extend.
3. Lay first corbel course.
4. Complete first course, filling in space between corbel and wall.
5. Lay 2nd and remaining courses.

NOTE: Depending on the conditions and situations, use a suitable means of tying Z-bars, wall ties, etc.

6. Joint and point work.

NOTE: Each course must not project more than 2 inches from the previous course. The maximum projection must not exceed $1/2$ the thickness of the wall.

LEARNING ACTIVITIES

1. Read pages 108-109 "Corbeling Details" in Bricklaying Skill and Practice. Answer and discuss the following.
 - a. Define "corbeled out."
 - b. Why are headers used?
 - c. How do you determine the maximum extension of a projection?
 - d. Define "eccentric loads".
 - e. When can you use stretchers?
2. Given the following dimensions - determine how much each projection should extend.

	Wall Thickness	Maximum Projection
a.	15 ft.	
b.	16 ft.	
c.	8 ft.	
d.	3 yds.	
3. Attend a lecture/demonstration by your instructor on corbeling a wall. Take notes and identify each major step to follow.

4. Practice corbeling a wall. Your instructor will give you the specifications to follow. When you can form a corbel without using additional references ask your instructor for the Evaluation.

EVALUATION

You will be given the necessary equipment, supplies, and specifications. You must corbel a wall and receive a satisfactory rating on each item on the Student Checklist.

STUDENT CHECKLIST

Satisfactory

Unsatisfactory

1. Does not sag or droop.
2. Plumb, straight and level.
3. Free of holes and cracks
4. Final projection does not exceed more than $\frac{1}{2}$ of the wall's thickness.
5. Each course of the corbel does not exceed 2" more than the ones under it.

STUDENT COMPETENCY SHEET

MODULE 07

Laying Columns

COMPETENCY 01

Build square brick columns.

PERFORMANCE GUIDE

1. Determine size and height of column and type of brick.
2. Lay first course and level and square it.
3. Lay additional courses.
4. Scale, level and plumb additional course.
5. Point and joint the brick column.
6. If column is load bearing, fill cavity with desired reinforcement.

LEARNING ACTIVITIES

1. Read page 95 "Laying Columns" in Bricklaying Skill and Practice and study Fig. 6-7 on page 96. Your instructor will quiz you on the information. You must know the order to lay the first and second course.
2. Attend a lecture/demonstration by your instructor on laying square columns. Take notes on each of the major steps to follow and answer these questions from the lecture.
 - a. Why is the center bat necessary.
 - b. Why do you follow a certain order when laying the column.
 - c. What is the margin of error you can have in a weight bearing column?
 - d. How long do you have to wait before you apply weight to the column?
3. Using your notes from the lecture and the Performance Guide above, practice laying square columns. Check with your instructor after each major step. When you can lay a square brick column without using references, ask your instructor for the Evaluation.

EVALUATION

Lay a square column 12" x 12", six courses high. The column must be level, square, and plumb. Each course should be laid in the correct numerical order. You may not use references.

STUDENT COMPETENCY SHEET

MODULE 07

Laying Columns

COMPETENCY 02

Build rectangular brick columns.

PERFORMANCE GUIDE

1. Determine size of the column.
2. Square the column.
3. Dry bond and mark joints of columns
4. Remove dry bonded bricks.
5. Lay bricks in mortar.
 - a. Level and re-square first course.
6. Level and plumb each additional course.

LEARNING ACTIVITIES

1. Study the following columns drawn in Figure 9-20, page 137 in Modern Masonry.

- a. 8 in. x 12 in.
- b. 12 in. x 16 in.

Number the order you think each brick should be laid for the first course. Then number the bricks in the second course. When you are finished, check your answer with your class. Agree as a class on an order to use.

2. Attend a lecture/demonstration by your instructor on laying rectangular columns. Take notes to help you identify each major step to follow.
3. Use the Performance Guide above and your lecture notes to practice laying columns 8" x 12"... Check with your instructor after each course. When your instructor is satisfied with your work go on to Learning Activity 4.
4. Use your lecture notes and the Performance Guide above and practice laying columns 12" x 16". Check your work with your instructor after each major step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the necessary supplies and specifications. Build a rectangular brick column without using references. The column must be plumb, straight, and level with each course laid in the proper order.

STUDENT COMPETENCY SHEET

MODULE 07

Laying Columns

COMPETENCY 03

Build round brick columns.

PERFORMANCE GUIDE

1. Establish a center point according to specifications.
2. Draw circle according to specifications from center point.
3. Dry bond the circle.
4. Cut the inside edge of all brick at a 45° angle as needed.
5. Lay bricks in mortar according to circle specifications.
6. Tie bricks according to specifications.
7. Level each row and plumb at 12 inch intervals.
8. Tool joints according to specifications.
9. Clean column.

LEARNING ACTIVITIES

1. Attend a lecture by your instructor on circles. Make sure you know how to
 - a) establish a centerpoint of a circle.
 - b) draw a circle from a center point.

Your instructor will give you different sized circles to draw after the lecture.

2. Practice cutting bricks on the inside edge at a 45° angle. Do not go on until your instructor is satisfied with your work.
3. Attend a lecture/demonstration by your instructor on laying round brick columns. Take notes so you make sure you know
 - a) the order to lay each course.
 - b) how to tie the bricks.
 - c) how to level and plumb each course.
 - d) how to tool the joints.
4. Using the notes from the lecture and the Performance Guide above practice laying round brick columns. Check with your instructor after each major step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given all the necessary supplies. Build a round brick column. The column must be level, plumb, and ranged. You may not use references.

STUDENT COMPETENCY SHEET

MODULE 08

Preparing Foundations and Footings

COMPETENCY 01

Build forms for concrete.

PERFORMANCE GUIDE

1. Place two 5/8 inch steel rods horizontally and centered in footing 6 inches on center.
2. Overlap each adjoining piece of rod 15 inches and tie with wire.
3. Place and secure with wire 12 inch by 3/8 steel crossbars six feet on center.
4. Elevate rods 4 inches off the ground.
5. Place grade stakes in center of footing to height at which concrete is to be poured.

LEARNING ACTIVITIES

1. Read pages 167-168 "Footing forms" in Modern Masonry and answer the following questions.

- a. Can you pour a footing without using a form? How?
- b. What size lumber (thickness and width) do you use to build footing forms?
- c. What are cross spreaders? How do you use them?
- d. Should you fill in low spots under the footing with loose earth? Why or why not?
- e. What are stepped footings?

Discuss your answers with a small group.

2. Read pages 63-65 "Footings" in Masons and Builders Library. Be prepared to answer the following questions in a class discussion.
 - a. What size do you make the footing?
 - b. What are the two most important points to remember when you are laying footings.
3. Attend a lecture/demonstration by your instructor on building forms for concrete. Take notes and in your own words list the major steps to follow when you are building forms.
4. Attend a lecture by your instructor on reading blueprint specifications for laying footings. You must pass a quiz on identifying the symbols and lines on the blueprints.
5. Practice building forms for concrete footings. Use your notes and the Performance Guide above. Your instructor will assign you portions of a blueprint to build. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given a portion from a blueprint which describes the footings for a building. Build the footing without using additional references. The footing must meet building specifications.

STUDENT COMPETENCY SHEET

MODULE 08

Preparing Foundations and Footings

COMPETENCY 02

Construct piers.

PERFORMANCE GUIDE

1. Dimension, square and mark area for pier.
2. Lay corner masonry unit in mortar and level.
3. Lay remaining masonry units in first course level and straight-edge.
4. Lay corner masonry units in reverse direction on top of first course.
5. Level and plumb from corner to corner.
6. Lay remaining units in course level and straight-edge.
7. Continue to reverse corner units and repeat steps 4, 5 and 6 until desired height is reached.
8. Tool joints.

LEARNING ACTIVITIES

1. Study the drawings in figure 9-20 page 137 in Modern Masonry.
 - a. 8" x 8"
 - b. 12" x 12"
 - c. 16" x 16"

For the different size piers listed above, number the order you think each brick should be laid for the first course, then number the bricks in the second course. When you are finished, check your answers with your class. Agree as a class on an order to use.

2. Attend a lecture by your instructor on reading blueprint specifications for piers. You will be quized on the information. You must score 100% on the quiz.
3. Attend a lecture/demonstration by your instructor on laying piers. Take notes to help you identify each major step to follow.
4. Use the Performance Guide above and your notes to practice laying piers. Your instructor will give piers described on blueprints to lay. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the necessary supplies and building specifications. Build a 16" x 20" pier. The pier must be square, level, plumb and straight-edged. All work must be jointed and free of cracks and holes.

STUDENT COMPETENCY SHEET

MODULE 08

Preparing Foundations and Footings

COMPETENCY 03

Construct wall containing pilasters.

PERFORMANCE GUIDE

1. Determine where pilaster is to be located in wall.
2. Determine dimension of pilaster.
3. Lay out and bond pilaster in wall, making sure pilaster is square and parallel with face of wall.
4. Place anchors or metal ties in pilaster wall.
5. Build around and flush anchors or ties with mortar.
6. Continue to build pilaster as wall progresses.

NOTE: Pilaster must be built with full head joints.

LEARNING ACTIVITIES

1. Study the Figure 9-22 on page 137 in Modern Masonry. From the picture - define "pilaster." Check your definition with another student, then check it against the definition in the glossary.
2. Read pages 92-95 "Beam Support" in Bricklaying Skill and Practice and answer the following questions.
 - a. What are pilasters used for?
 - b. How do you determine their size?
 - c. Why do you use different course when laying a pilaster?
 - d. How long do you have to wait to put weight on a pilaster?
3. Study figure 6-5 on page 94 in Bricklaying Skill and Practice. Your instructor will quiz you on the order to lay each different course. You must score 100% on the quiz.
4. Attend a lecture by your instructor on reading blueprint specification of pilasters. You will be quizzed on this information. You must score 100%.
5. Attend a lecture/demonstration by your instructor on constructing pilasters. Take notes to make sure you know how to
 - a. Construct the pilaster square and parallel with the face of the wall.
 - b. Use anchors or metal ties.
 - c. Build around the anchors or ties.

STUDENT COMPETENCY SHEET

MODULE 08

Preparing Foundations and Footings

COMPETENCY 04

Raise a foundation.

PERFORMANCE GUIDE

1. Determine height of foundation wall from batter board line.
2. Plumb down from building line to locate position of foundation wall.
3. Lay out first course to determine cuts.
4. Build leads on each end of wall.
5. Put up line and build wall to top of leads using full head joints.
6. Repeat steps 4 and 5 until desired height is reached.

LEARNING ACTIVITIES

1. Read pages 131-135 "Foundation Walls" in Modern Masonry and answer the following:
 - a. List five different functions of a foundation wall.
 - b. What is a T foundation?
 - c. Why are foundation walls capped?

Discuss your answers with a small group or your instructor.

2. Attend a lecture by your instructor on the foundations detailed in figure 9-10 on pages 132-133 in Modern Masonry. You will be quizzed on the information. You must score at least 85% on the quiz.
3. Attend a lecture/demonstration by your instructor on raising a foundation. Take notes to make sure you know how to:
 - a. Determine the height of the foundation wall.
 - b. Locate the position of the foundation wall by plumbing down from the building line.
 - c. Determine cuts.
4. Practice raising a foundation wall using your notes and the Performance Guide above. Your instructor will give you building specifications. Check with your instructor after each major step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the necessary equipment, supplies and building specifications. Build a masonry foundation. The wall must be straight, level, plumb, without bats between leads and free of cracks and holes. The height of the wall must be built to batter board line. You may not use any additional references.

6. Practice laying pilasters using blueprint specifications, your notes and the Performance Guide above. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the necessary equipment, supplies, and building specifications. Construct a wall containing a pilaster. The pilaster must be level, plumb, square with the wall, and anchored solid to the wall. You may not use any additional references.

STUDENT COMPETENCY SHEET

MODULE 09

Constructing Buildings

COMPETENCY 01

Install wall ties.

PERFORMANCE GUIDE

1. Measure 16 inches vertically from starting point of frame structure on each end and mark.
2. Place chalk line horizontally on vertical measurements and chalk.
3. Space and affix wall ties on horizontal line 16 inches on center.
4. Continue to space and affix wall ties 16 inches on center both vertically and horizontally.
5. When wall reaches wall ties, bend ties on top of masonry at 90 degree angle.
6. Continue to build wall and follow same procedure as each wall tie height is reached.

LEARNING ACTIVITIES

1. Read page 65 in Modern Masonry and answer the following:
 - a. List three uses of metal ties.
 - b. What size are rectangular ties?
 - c. When would you use Z-bar ties?
 - d. Which tie do you use to anchor a wall to a column or beam?
 - e. How much space will a corrugated tie serve?

Check your answers with your instructor.

2. Make a display showing the popular types of ties and their uses. Your instructor will quiz you on the information. You must identify the tie and its use with 90% accuracy.
3. Attend a lecture/demonstration by your instructor on installing wall ties. Take notes to make sure you know how to
 - a. find starting point on frame.
 - b. place the ties at proper spaces.
 - c. bend ties correctly.

4. Practice installing wall ties using your notes and the Performance Guide above. Check with your instructor after you complete each major step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

Your instructor will give you building specifications, equipment and supplies. Choose the correct tie and install the wall tie. The wall ties must be installed to the frame wall 16 inches on center horizontally and vertically and fasten to the masonry wall at 90° angle. The wall tie must not be visible on face side of the wall.

STUDENT COMPETENCY SHEET

MODULE 09

Constructing Buildings

COMPETENCY 02

Place beams.

PERFORMANCE GUIDE

1. Provide solid masonry for beams to sit on.
2. Spread mortar on area where beam is to sit.
3. Raise and set beam in desired position.
4. Finish joints.

LEARNING ACTIVITIES

1. Attend a lecture/demonstration by your instructor on safety precautions used when you are setting beams. You must observe these safety precautions at all times.
2. As a small group discuss how you should mix mortar to support beams. Report your findings to the class. Then as a class decide the correct proportions to use. Check your decision with your instructor.
3. Attend a lecture/demonstration by your instructor on placing beams. Take notes to make sure you know how to
 - a. level and plumb beam
 - b. distribute weight
 - c. finish the joints
4. Practice setting beams using your lecture notes and the Performance Guide above. Check with your instructor after each major step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the necessary equipment, tools, supplies and building specifications. Set the beam. The beam must be level, plumb, and the weight must be distributed evenly on both sides of the opening crossed.

STUDENT COMPETENCY SHEET

MODULE 09

Constructing Buildings

COMPETENCY 03

Pour concrete.

PERFORMANCE GUIDE

1. Place 10 gage reinforcement wire in area to be poured.
2. Raise reinforcement wire two inches from bottom of excavated area.
3. Place and secure expansion joints at a maximum of 30 feet apart.
4. Pour concrete in area allowing concrete to flow from form to form.
5. Vibrate or tamp concrete tightly to inside of forms.
6. Extend screed board from form to form across the concrete.
7. Screed concrete.
8. Continue above procedure until driveway is poured.

LEARNING ACTIVITIES

1. Read pages 79-98 in Modern Masonry and answer questions 1-31 on page 104. Discuss your answers with the class.
2. Pass a quiz on concrete fundamentals. You must score at least 80% on the quiz.
3. Attend a lecture/demonstration by your instructor on steps 1-3 in the Performance Guide. Take any notes necessary. Practice laying reinforcement wire and expansion joints according to building specifications. Check your work with your instructor. When it is satisfactory, go on to Learning Activity 4.
4. Attend a lecture/demonstration by your instructor on pouring concrete. Take any notes necessary. See your instructor for practice in pouring concrete. Check your work with your instructor. When it is satisfactory, go on to Learning Activity 5.
5. Attend a lecture/demonstration by your instructor on screeding. Take notes to make sure you can use a screed and bullfloat. Practice screeding poured concrete. Check your work with your instructor. When it is satisfactory, ask for the Evaluation.

EVALUATION

Your instructor will give you building specifications. Pour the concrete. It must be at least four inches thick, finished even with the top of the form. Water must not stand on the finished surface.

STUDENT COMPETENCY SHEET

MODULE 09

Constructing Buildings

COMPETENCY 04

Make reinforced lintels.

PERFORMANCE GUIDE

1. Place 5/8 inch steel rods 4 inches apart from top to bottom of form.
2. Pour concrete within 2 inches of top of form.
3. Place second steel rod on top of concrete and centered in form.
4. Continue to fill form to top with concrete.
5. Vibrate concrete in form.

LEARNING ACTIVITIES

1. Attend a lecture by your instructor on the three main types of lintels. From the lecture you should be able to describe how each are different and similar to each other. You will be quizzed on the information. You must score 90%.
2. Study the specifications for lintels on page 222 and 223 in Modern Masonry. Sketch these lintels to scale. Make sure you draw the reinforcements and have them spaced correctly. Check your work with your instructor.
3. Attend a lecture/demonstration by your instructor on making lintels. Take notes to make sure you know how to:
 - a. select the form
 - b. mix concrete
 - c. vibrate concrete
4. Practice making lintels using your lecture notes and the Performance Guide above. Your instructor will give you the building specifications. Check with your instructor after each major step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the equipment, supplies and specifications. Make a reinforced lintel. The lintel must have 2 steel rods spaced equally and centered. The bottom must be smooth and straight.

STUDENT COMPETENCY SHEET

MODULE 09

Constructing Buildings

COMPETENCY 05

Set lintels.

PERFORMANCE GUIDE

1. Wall must be built to allow a minimum of 8 inch bearings across top of opening on both sides.
2. Spread a solid bed of mortar where lintel is to be set.
3. Raise wedge and set lintel in the mortar on 8 inch bearings.
4. Level lintel.
5. Plumb lintel with face of wall.
6. Finish joints.

LEARNING ACTIVITIES

1. Read pages 156-158 in Masons and Builders Library and answer the following questions.
 - a. Define lintel.
 - b. Why do you use lintels?
 - c. When do you use a wooden lintel?
 - d. How far should lintels extend into the brick work?

Check your answers with your instructor.

2. Use Table 1, on page 158 in Masons and Builders Library and describe the number and size lintels needed for:

	Wall Thickness	Span.
a.	12"	4 ft.
b.	8"	4 ft.
c.	8"	3 ft. (wood)
d.	8"	8 ft.
e.	12"	8 ft.
f.	12"	6 ft.

3. Attend a lecture/demonstration by your instructor on setting lintels. Take notes to make sure you know:
 - a. Why masonry lintels are being used more than steel.
 - b. Why control joints are used.
 - c. Why you lay metal plates under the control joints.
 - d. Major steps in setting lintels.

4. Attend a lecture by your instructor on identifying lintel specifications in blueprints. After the lecture, take a quiz on the information covered in Learning Activities 1-4. You must score at least 80%.
5. Practice setting lintels. Your instructor will give you the building specifications to follow. You may use your notes and the Performance Guide above. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the tools, equipment and building specifications you will need. Set a lintel. The lintel must have a minimum of 8" bearing, and be level without resting on top of the frame. It must be plumb with the face of the wall. You may not use references.

STUDENT COMPETENCY SHEET

MODULE 09

Constructing Buildings

COMPETENCY 06

Construct sills (Rowlock).

PERFORMANCE GUIDE

1. Install flashing.
2. Determine projection and desired fall.
3. Cut brick to desired projection and fall.
4. Course window sill to determine amount of brick needed.
5. Spread mortar on masonry under the bottom of the window where sill is to be laid.
6. Lay sill in place on courses.
7. Tool joints.
8. Remove excess mortar from sill.

LEARNING ACTIVITIES

1. Read page 99 "Flashing Details" in Bricklaying Skill and Practice. Your instructor will demonstrate how to install the flashing under a sill. Take any notes to help you.
2. Practice installing flashing. Check your work with your instructor. Do not go on until your instructor is satisfied with your work.
3. Read page 97-98 "sill height" in Bricklaying Skill and Practice. In your own words write the steps to laying a rowlock sill. Check your work with your instructor.
4. Attend a lecture by your instructor on the two types of sills.

You must identify slip sills and lug sills on a quiz. You must also describe the advantages of each type of sill.
5. Attend a lecture/demonstration by your instructor on laying sills. Take notes to make sure you know how to:
 - a. determine projection and fall
 - b. cut brick
 - c. course the window sill
 - d. tool the joints
 - e. read blueprint specification for sills.
6. Practice laying sills using your notes and the Performance Guide above. Check your work with your instructor after each major step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the equipment, supplies and building specifications you will need. Build a rowlock window sill. All the bricks must be smooth and tight against the bottom of the window. All head joints must be equal and the fall must be away from the window. The bricks must project equally. You may not use any additional references.

STUDENT COMPETENCY SHEET

MODULE 09

Constructing Buildings

COMPETENCY 07

Set window.

PERFORMANCE GUIDE

1. Measure the size of the window.
2. Lay out window according to specified dimensions.
3. Build window jamb up to height of lintel using sash end blocks.
4. Slide window in sash end blocks from top down.
5. Place lintel horizontally across top of window opening.
6. Shove window upward and tight against bottom of lintel and wedge.
7. Install flashing as required.
8. Lay window sill tightly to bottom of window.

LEARNING ACTIVITIES

1. Read "Window and Door Details" in Modern Masonry on page 149. Your instructor will ask you to define head and jambs.
2. Attend a lecture by your instructor on setting windows. You will be quizzed on the following information:
 - a. how to lay out window
 - b. use of sash end blocks
 - c. how to slide the window in
 - d. placement of lintel
 - e. install flashing.

You must score at least 80% on the quiz.

3. Attend a lecture by your instructor on window details for masonry construction. Use Fig. 9-54 in Modern Masonry page 148 as a reference. Take notes to make sure you can identify:
 - a. unit dimension height
 - b. sash opening height
 - c. unit dimension width
 - d. sill, head, and jamb.

4. Attend a demonstration by your instructor on setting windows. Take notes on the steps to follow when you:
 - a. lay out window
 - b. build window jamb
 - c. slide window in sash end blocks
 - d. shove window against bottom of lintel and wedge.
5. Practice setting windows using your notes and the Performance Guide above. Your instructor will give you the building specifications. Check with your instructor after each major step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the equipment, tools, and building specifications you will need. Set a window without using additional references. The sides, bottom and top of the window must fit tightly in window opening and frames must stand vertically plumb and square with the wall. The window must open, close and lock.

STUDENT COMPETENCY SHEET

MODULE 09

Constructing Buildings

COMPETENCY 08

Use anchors to tie walls together.

PERFORMANCE GUIDE

1. Affix wall anchors to existing structure according to specifications.
2. Lay outside wall and bend anchors on top of proper courses.

LEARNING ACTIVITIES

1. Read pages 125-133 in Masons and Builders' Library and answer the following:
 - a. How is an anchor different than a reinforcing rod?
 - b. List two purposes of anchors.
 - c. Why should walls be anchored where they meet a corner?
 - d. Define "provision for tying".
 - e. What is the minimum distance the anchor should project out?
 - f. What type of bolt do you use to tie an intersecting wall with the outside wall?
 - g. Why are the ends of joists beveled? Discuss your answers in a class discussion.
2. Attend a lecture by your instructor on the anchors used in brick work. You will be quizzed on the information. You must identify the anchor and describe its main use.
3. Practice using anchors to tie walls together and doors to walls. Your instructor will give you the building specifications. You can use your notes and the Performance Guide above. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the equipment, tools, supplies and building specifications. Use the anchors to tie walls together. All the anchors must be installed horizontally on 16 or 32 inch centers and 16 inches apart vertically.

STUDENT COMPETENCY SHEET

MODULE 09

Constructing Buildings

COMPETENCY 09

Lay a flight of steps.

PERFORMANCE GUIDE

1. Measure out 3 feet from given point.
2. Mark and square from given point.
3. Dry bond with stretcher course.
4. Lay stretcher course.
5. Fill in back up area with masonry material.
6. Dry bond and mark two rowlock courses back to back.
7. Lay rowlock courses in mortar with desired fall.
8. Repeat step 5.
9. Measure in 12 inches and follow same procedure for additional steps.

LEARNING ACTIVITIES

1. Study Fig. 13 on page 235 in Masons and Builders Library and answer the following questions.
 - a. Why was the concrete step base poured first?
 - b. What is the difference between drawing "a" and drawing "b"?
 - c. Identify the reinforcing rod in the drawings.
2. Attend a lecture/demonstration by your instructor on laying steps. Take notes to make sure you know
 - a. definition of tread and risers
 - b. how to read step specifications from a blueprint.
 - c. how to determine angle of slope.
 - d. how to determine rise angle when laying steps.
3. Practice laying steps using your notes and the Performance Guide above. Your instructor will give you the building specifications you will need. Check with your instructor after each major step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the equipment, tools, supplies and building specifications you will need. Lay three brick steps. The steps must be laid 3 feet by 3 feet with 7 inch risers, 12 inch treads, specified fall. It must also be level, plumb, straight edged and aligned.

STUDENT COMPETENCY SHEET

MODULE 10

Performing Miscellaneous Masonry Work

COMPETENCY 01

Clean brick walls.

PERFORMANCE GUIDE

1. Brush entire wall to remove rough edges and loose mortar.
2. If acid solution is used, wet area to be cleaned.
3. Scrub area with acid solution until all areas are covered.
4. Rinse wall with lots of clean water when the acid has taken effect.
5. Inspect wall to see if all loose mortar and lime stains have been removed.

LEARNING ACTIVITIES

1. Read pages 127-128 in Modern Masonry and discuss the following.
 - a. Why should you clean a sample section first?
 - b. How do you clean dark brick without acid?
 - c. If you use acid what safety precautions must you take?
 - d. How is light brick cleaning different than dark brick cleaning?
2. Attend a lecture by your instructor on mixing hydrochloric acid. Under your instructor's supervision, mix a solution to clean dark brick and light brick.
3. Practice cleaning individual bricks until you are ready for the Evaluation. Make sure you check with your instructor to review your work.

EVALUATION

Your instructor will assign you a section of a brick wall to clean. You must receive a satisfactory rating on each item of the Student Checklist.

10/01

STUDENT CHECK LIST

CLEAN BRICK WALLS

Satisfactory

Unsatisfactory

1. Proper method selected.
2. Acid mixed correctly.
3. All excess mortar and lime stains removed.
4. Safety precautions observed.

STUDENT COMPETENCY SHEET

MODULE 10

Performing Miscellaneous Masonry Work

COMPETENCY 02

Lay glass blocks.

PERFORMANCE GUIDE

1. Along a chalk line, lay out for a wall 10 glass blocks long allowing 1/4 inch for head joints.
2. Build an 8 x 16 inch brick pier plumb and level at each end to desired height.
3. Stretch a line from one brick jamb to other 8 inches off the floor.
4. Lay the first course of block plumb, true and level to the line. Use 1/4 inch head joints.

NOTE: Do not strike the blocks with the trowel handle for this may damage them. Place a rubber tip cover over the trowel.

5. Install wall ties at desired intervals. Embed the ties completely in the mortar joints.
6. Repeat steps 4 and 5 until the desired height is reached.
7. Finish exposed surface of the mortar joints when mortar is set.

LEARNING ACTIVITIES

1. Read pages 213-220 "Glass Block" in Masons and Builders Library. Be prepared to discuss the following.
 - a. Most common types of glass blocks.
 - b. Advantages and disadvantages of glass blocks.
 - c. Use of anchors with glass blocks.
 - d. Mortar mix to use with glass blocks.
 - e. Mortar thickness.
2. Read "Table 4" on page 212 in Masons and Builders Library. You will be quizzed on the information. You must score 80%.
3. Attend a lecture by your instructor on safety precautions to follow when working with glass blocks. You must observe these precautions at all times.

4. Attend a lecture/demonstration by your instructor on laying glass blocks. Take notes so you know the major steps to follow. Compare your notes with the Performance Guide above. Discuss any differences with another student.
5. Practice mixing mortar for glass blocks. Check your work with your instructor. When it is mixed right, go on to Learning Activity 6.
6. Practice laying glass blocks. Your instructor will give you the building specifications. Use your notes and the Performance Guide above. Check your work with your instructor after each major step. When you are ready, ask for the Evaluation.

EVALUATION

You will be given the tools, equipment, supplies and building specifications you will need. Lay a wall with glass blocks. The wall must be level, plumb, straight edged, ranged and jointed according to specifications.

STUDENT COMPETENCY SHEET

MODULE 10

Performing Miscellaneous Masonry Work

COMPETENCY 03

Lay structural clay tile.

PERFORMANCE GUIDE

1. Dry bond 5 clay tiles along a chalked line.
2. Lay clay tile with 1/2 inch mortar joints.
3. Bed up tiles 1 and 5, level, plumb and fill in the remaining tiles.
4. Cut a 6 inch piece of clay tile on each end of next course to form a 1/2 inch overlap.
5. Spread mortar for next course on kiln and face side of tile.
6. Repeat steps 3 and 5 until project is completed.
7. Repeat step 4 on every other course.

LEARNING ACTIVITIES

1. Read pages 202-212 in Masons and Builders Library. Be prepared to discuss the following with your class.
 - a. sizes and shapes of clay tile.
 - b. difference between laying brick and laying clay tile.
 - c. mortar mix and joint thickness for tile.
2. Study Fig. 1 on page 204 and Fig. 2 on page 207 in Masons and Builders Library. Your instructor will give you a quiz on identifying the most popular shapes and sizes of structural clay tile. You must score 85%.
3. Attend a lecture/demonstration by your instructor on cutting clay tile. Practice cutting the tile. When you are ready, your instructor will watch you cut the tile. When your work is satisfactory, go on to Learning Activity 4.
4. Attend a lecture/demonstration by your instructor on laying clay tile. Take notes to make sure you know
 - a. differences when you are going to lay them horizontally or vertically.
 - b. buttering the edges.
 - c. finishing joints.
5. Practice laying clay tile. Your instructor will give you the building specifications. You may use your notes and the Performance Guide above. Check your work with your instructor after each major step. When you are ready, ask for the Evaluation.

EVALUATION

You will be given the equipment, tools, supplies and building specifications you will need. Lay the tile. The tile must be level, plumb, straight edged, ranged and tooled correctly.

STUDENT COMPETENCY SHEET

MODULE 10

Performing Miscellaneous Masonry Work

COMPETENCY 04

Lay masonry floors.

PERFORMANCE GUIDE

1. Measure a line or square and establish the center of floor area.
2. Dry bond from center brick to opposite sides.
3. Spread and tamp evenly and smooth damp cement grout to floor level around perimeter.
4. Lay border row straight, level or with proper pitch 2-1/4 inches from floor height.
5. Grout and lay bricks in basket weave pattern, using a line or tampering board.
6. Grout all joints full.

LEARNING ACTIVITIES

1. Read pages 149-151 in Modern Masonry. Be prepared to discuss the following with your class.
 - a. Main parts of a masonry floor
 - b. Differences between laying floors inside and outside.
 - c. Selection of patterns.
 - d. Advantages and disadvantages of using masonry for floors.
2. Attend a lecture by your instructor on bases to use when laying masonry floors. Your instructor will assign you an area of ground. Describe the work that must be done before the bricks can be laid.
3. Pick an area to lay a wall and a floor. Describe:
 - a. the pattern you will use.
 - b. the cushion
 - c. the base
 - d. how you will finish the joints.

Compare your project with the other students in your class.
4. Attend a lecture/demonstration by your instructor on laying masonry floors. Take down the major steps to follow. Compare your notes with the Performance Guide above. Discuss the differences with your class.

5. Practice laying masonry floors. Your instructor will give you the building specifications. You may use your notes and the Performance Guide above. Check with your instructor after each major step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the equipment, supplies and building specifications you will need. Lay a flatbed basket weave pattern masonry floor. The border bricks on opposite ends must match. The floor must be level with border and the pattern must be uniform with all joints fully fitted and finished.

STUDENT COMPETENCY SHEET

MODULE 10

Performing Miscellaneous Masonry Work

COMPETENCY 05

Lay masonry walks.

PERFORMANCE GUIDE

1. Establish points and elevations of walk.
2. Bond and lay brick border around walk area.
3. Bond and make necessary cuts for walk.
4. Mark courses on border where lead brick is to be laid.
5. Put up line and lay from one end to the other.
6. Tool and finish joints according to plans.

LEARNING ACTIVITIES

1. Read pages 223-233 in Masons and Builders Library. Be prepared to discuss the following with your class.
 - a. Best brick to use.
 - b. The three layers of walks.
 - c. Different materials to use for base.
 - d. Edges.
 - e. Drain edge.
2. Attend a lecture/demonstration by your instructor on determining slopes. Practice until you can measure the slope within 1/8" to 1/4" per foot.
3. Attend a lecture/demonstration by your instructor on mortaring. Take notes to make sure you can explain the dry mix method and pourable-grout method.
4. Practice laying brick walk. Your instructor will give you the building specifications. Use the Performance Guide above as an aid. Check with your instructor after each major step. When you are ready, ask for the Evaluation.

EVALUATION

You will be given the tools, supplies and building specifications you will need. Lay a brick walk in a running bond pattern. The walk must be level and straight with head and bed joints equalized and head joints in line with the running bond pattern.

STUDENT COMPETENCY SHEET

MODULE 10

Performing Miscellaneous Masonry Work

COMPETENCY 06

Estimate masonry materials needed.

PERFORMANCE GUIDE

1. Study house plans.
2. Compute areas.
3. Add area for openings of doors, windows, etc. and subtract it from total area.
4. Select size of brick.
5. Select thickness of mortar.
6. Use tables to determine number of brick and amount of mortar required.

LEARNING ACTIVITIES

1. Read pages 284-285 "Estimating Areas, Volumes, and Materials" in Masonry Simplified. Be prepared to pass a quiz on the "wall-area" formula for estimating brick masonry.
2. Read page 185 in Modern Masonry. Be prepared to pass a quiz on how to compute the amount of mortar needed for a job.
3. Work the two problems on page 185 in Modern Masonry. When you are finished, check your work with your instructor. If they are correct, go on to Learning Activity 4.
4. Estimate the amount of bricks and mortar needed if you were going to brick one of the walls in your class room. Show your work to your instructor. Be sure to include:
 - a. Wall measurements
 - b. Area subtracted (doors, windows)
 - c. Size brick
 - d. Size joints
 - e. Number of brick per 100 sq. ft.
 - f. Cubic feet of mortar per 100 sq. ft.
 - g. Total amount of mortar and brick.
5. Compute the allowances for waste and breakage for Learning Activity 4. Use the formula on page 185 in Modern Masonry. Check your work with your instructor. If it is satisfactory go on to Learning Activity 6.
6. Attend a lecture/demonstration by your instructor on estimating materials from blueprints. After the lecture, your instructor will assign you portions of the blueprints to estimate. Show your work to your instructor. Be sure to include:
 - a. Wall measurement

- b. Area subtracted (doors, windows)
- c. Size brick
- d. Size joints
- e. Number of brick per 100 sq. ft.
- f. Cubic feet of mortar per 100 sq. ft.
- g. Total amount of mortar and brick
- h. Waste amount.

Keep estimating different sections of the blueprints until your instructor tells you that you are ready for the Evaluation.

EVALUATION

You will be given a section of a blueprint and reference tables. Estimate the amount of materials needed. You must show the following with 95% accuracy:

- a. Wall measurement
- b. Area subtracted (doors, windows)
- c. Size brick
- d. Size joints
- e. Number of brick per 100 sq. ft.
- f. Cubic feet of mortar per 100 sq. ft.
- g. Total amount of mortar and brick
- h. Waste amount.

STUDENT COMPETENCY SHEET

MODULE 11

Arches

COMPETENCY 01

Build a roman arch.

PERFORMANCE GUIDE

1. Locate and place a prepared semicircular (arch form) wood center where arch is to be laid.
2. Dry bond bricks to determine where piers are to be laid.
3. Build piers to height where voussoirs are to begin.
4. Place and brace bottom of wood center at top of pier height.
5. Level and plumb wood center.
6. Lay first rowlock voussoir with face against wood center.
7. Continue to build piers and cut creepers to fit angle of arch.
8. Continue to build until arch is formed.

NOTE: Check and bond for key brick to fit.

9. Flush key brick tightly with mortar.
10. Cross over arch with stretcher courses.
11. Allow to set for at least 24 hours and release wood center.
12. Point up soffit (underneath face of first rowlock) and tool joints.

LEARNING ACTIVITIES

1. Define these terms:

- a. major arch
- b. minor arch
- c. centering (temporary shoring)
- d. crown of the arch
- e. arch axis
- f. extrados
- g. intrados
- h. soffit
- i. rise
- j. depth
- k. camber
- l. voussoir
- m. creepers

When you have defined these terms, sketch an arch and label each of the terms above. Check your work with your instructor.

2. Pass a quiz on the terms above. Your instructor will give you a sketch of an arch. You must identify each major part with 100% accuracy.
3. Read pages 147-149 in Modern Masonry and answer the following questions.
 - a. What is a jack arch? What are its advantages and disadvantages?
 - b. What is a segmental arch? What are its advantages and disadvantages?

Check your answers with your instructor.

4. Participate in a class discussion on how the ancient masons built major arches. Compare this with how modern masons build major arches.
5. Attend a lecture/demonstration by your instructor on using arch forms. Practice setting the arch form (centering) according to different building specifications. Check your work with your instructor.
6. Attend a lecture by your instructor on determining the number of bricks to be used. Compute the number of bricks for roman (rowlock) arches. Your instructor will give you the lengths. Check your work with your instructor.
7. Attend a lecture/demonstration by your instructor on building a roman (rowlock) arch. Take notes to make sure you know how to:
 - a. level and plumb wood center
 - b. lay the first course
 - c. build peers and cut creepers
 - d. fit key brick
8. Use the Performance Guide above and your notes to build a roman arch. Check your work with your instructor after each major step. Your instructor will give you the building specifications. When you are ready, ask for the Evaluation.

EVALUATION

You will be given the equipment, supplies, and building specifications that you will need to build a roman (rowlock) arch. The wall must not crack when the wood center is released. The voussiors must be in line with the face of the wall and the bed joints must be uniform around the arch. The soffit must be flush and free of holes and the stretcher course across the top of the arch must not be interrupted by arch heights or cuts in wall.

STUDENT COMPETENCY SHEET

MODULE 11

Arches

COMPETENCY 02

Build a soldier arch.

PERFORMANCE GUIDE

1. Locate and place a prepared semicircular (arch form) wood center where arch is to be laid.
2. Dry bond bricks to determine where piers are to be laid.
3. Build piers to height where soldier arch is to begin.
4. Place and brace bottom of wood center at pier height.
5. Level and plumb wood center.
6. Lay soldier course around arch form.
7. Continue to build piers and cut creepers to fit angle of soldier arch.
8. Continue to build until arch is formed.

Note: Check and bond for key brick to fit.

9. Flush key brick tightly with mortar.
10. Cross over arch with stretcher course.
11. Allow to set for at least 24 hours and release wood center.
12. Point up soffit (underneath face of soldier arch) and tool joints.

LEARNING ACTIVITIES

NOTE: If you have completed 11/01 "Build a roman arch," you may begin this with Competency Sheet Learning Activity 6.

1. Define these terms:

- a. major arch
- b. minor arch
- c. centering (temporary shoring)
- d. crown of the arch
- e. arch axis
- f. extrados
- g. intrados
- h. soffit
- i. rise
- j. depth
- k. camber
- l. voussoir
- m. creepers

When you have define these terms, sketch an arch and label each of terms above. Check your work with your instructor.

2. Pass a quiz on the terms above. Your instructor will give you a sketch of an arch. You must identify each major part with 100% accuracy.
3. Read pages 147-149 in Modern Masonry and answer the following questions.
 - a. What is a jack arch? What are its advantages and disadvantages?
 - b. What is a segmental arch? What are its advantages and disadvantages?
4. Participate in a class discussion how the ancient masons built major arches. Compare this with how modern masons build major arches.
5. Attend a lecture/demonstration by your instructor on using arch forms. Practice setting the arch form (centering) according to different building specifications. Check your work with your instructor.
6. Attend a lecture by your instructor on determining the number of bricks to be used. Compute the number of bricks for soldier arches. Your instructor will give you the lengths. Check your work with your instructor.
7. Attend a lecture/demonstration by your instructor on building a soldier arch. Take notes to make sure you know how to
 - a. level and plumb wood center
 - b. lay the first course
 - c. build peers and cut creepers
 - d. fit key bricks
8. Use the Performance Guide above and your notes to build a soldier arch. Check your work with your instructor after each major step. Your instructor will give you the building specifications. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the equipment, supplies and building specifications you will need. Build a soldier arch. The wall must not crack when the wood center is released. The soldier arch must be in line with face of wall and the bed joints must be uniform around the arch. The bottom of the arch (soffitt) must be flush and free of holes. The stretcher course across the top of the arch must not be interrupted by arch height or cuts in wall.

STUDENT COMPETENCY SHEET

MODULE 12

Constructing Residential Chimneys and Fireplaces

COMPETENCY 01

Lay bottom of fireplace.

PERFORMANCE GUIDE

1. Set footings.
2. Lay blocks to hearth level.
3. Check size of clean out door measure to center of chimney.
4. Place center of clean-out at center of chimney.
5. Plumb and level the door.
6. Anchor door to bricks.
7. Place lintel to cross over top of door.
8. Lay and level fireplace bottom.
9. Finish joints.

LEARNING ACTIVITIES

1. Read pages 48-49 in Bricklaying Skill and Practice. You will be quizzed on the following:
 - a. Maximum strength.
 - b. Protection of outside bricks.
 - c. How to mix clay for mortar.
 - d. Home made mortar.
 - e. When and why some bricks are "painted" with the mortar mix.

You must score 80% on this quiz.
2. Read pages 131-135 in Bricklaying Skill and Practice and be prepared to discuss the following in a class discussion.
 - a. The importance of a footing.
 - b. Location of the ash pit and clean out door.
 - c. Difference between inner and outer hearth.
 - d. Local building codes for fireplaces.
3. Attend a lecture/demonstration by your instructor on reading blue-print specifications for the bottom of fireplaces. You must be able to interpret all specifications for
 - a. footings
 - b. ash pit
 - c. cleanout door
 - d. inner and outer hearth.

You must pass a quiz (90%) given to you on the information.

4. Attend a lecture by your instructor on installing an ash dump. Take notes to make sure you know how to install the dump before or after the hearth has been laid.
5. Practice installing an ash dump using your notes and the Performance Guide above. See you instructor for building specifications. Check your work with your instructor after each major step. When your work is satisfactory, go on to Learning Activity 6.
6. Attend a lecture/demonstration by your instructor on laying the inner hearth. Take notes to make sure you know:
 - a. Methods of support, (reinforced, masonry or trimmer arch)
 - b. Blueprint specifications
 - c. Methods to finish joints.
7. Practice laying inner hearths using your notes and the Performance Guide above. See your instructor for Building specifications. Check your work with your instructor after each major step. When your work is satisfactory, ask for the Evaluation.

EVALUATION

You will be given the necessary equipment, tools, supplies and building specifications. Lay the bottom of the fireplaces (footings, ash dump, clean out door, inner and outer hearth.) You must receive a satisfactory rating on each item of the Checklist below.

STUDENT CHECKLIST

	Satisfactory	Unsatisfactory
1. Mortar mixed correctly.		
2. Ash dump fits in center of floor within 2 to 3 inches of back of fire box.		
3. Door of dump does not come in contact with firebrick when open.		
4. Door of clean out door level, plumb and bricks laid behind lip of door.		
5. Fireplace bottom is level.		
6. Mortar joints do not exceed 3/8 of an inch.		
7. Joints fully filled and finished.		

STUDENT COMPETENCY SHEET

MODULE 12

Constructing Residential Chimneys and Fireplaces

COMPETENCY 02

Lay back of fireplace.

PERFORMANCE GUIDE

1. Get dimensions of damper to be used in fireplace.
2. Mark the line for base of back wall according to damper size.
3. Dry bond the back wall according to damper size.
4. Remove dry bond and lay bricks in place.
5. Lay bricks plumb, straight and level to a height of 14 to 16 inches, then level to fit the bottom flange of the damper.
6. Finish joints.

LEARNING ACTIVITIES

1. Read page 136 "Throat, Dampers and Smoke Chamber" in Bricklaying Skill and Practice. Get blueprints from your instructor and describe how to taper the throat for each blueprint.
2. Attend a lecture/demonstration by your instructor on laying the back of a fireplace. Lay the throat according to the blueprints you used in Learning Activity 1. Check your work with your instructor after each major step.
3. Practice laying the back of fireplaces including the smoke shelf. Your instructor will give you the blueprints to follow. Follow the Performance Guide above. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the tools, equipment and blueprints you will need. Lay a back of a fireplace. The back must begin sloping forward from 14 to 16 inches above the fireplace and should fit underneath the flange and be smooth with the inside opening of the damper. The mortar joints should not exceed 3/8 inch in thickness.

STUDENT COMPETENCY SHEET

MODULE 12

Constructing Residential Chimneys and Fireplaces

COMPETENCY 03

Lay sides of fireplace.

PERFORMANCE GUIDE

1. Measure and mark sides from front to rear of fireplace opening.
2. Dry bond side walls.
3. Remove dry bond and lay bricks in place.
4. Straight edge the first row of bricks.
5. Lay each successive layer level, plumb and straight.
6. Finish joints.

LEARNING ACTIVITIES

1. Read pages 135 "Fireplace Walls" in Bricklaying Skill and Practice and answer the following questions.
 - a. What is the main function of fireplaces walls?
 - b. What are the minimum dimensions for fireplace walls?
 - c. What is the jamb?
 - d. What is the breast?
2. Attend a lecture by your instructor on reading blueprint specifications for the walls of fireplaces. You must pass a quiz on the information by scoring at least 85%.
3. Attend a lecture/demonstration by your instructor on laying fireplace walls. Take notes to make sure you know how to
 - a. measure fireplace
 - b. correct size for mortar joints
 - c. finish the joints correctly
4. Practice laying fireplace walls using your notes from the lecture and the Performance Guide above. Your instructor will give you the building specifications. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the tools, equipment and specification you will need. Lay the sides of the fireplace. The sides must be level, plumb and straight edged. The joints must be $\frac{3}{8}$ inch thick and bonded with the back wall.

STUDENT COMPETENCY SHEET

MODULE 12

Constructing Residential Chimneys and Fireplaces

COMPETENCY 04

Insert a damper.

PERFORMANCE GUIDE

1. Assemble damper door.
2. Assemble door catch or stopper.
3. Assemble door handle.
4. Embed flange in mortar spread in fire brick.
5. Align damper with front face of fire bricks.
6. Seal with mortar.

LEARNING ACTIVITIES

1. Study Fig. 9-66 on page 153 in Modern Masonry. Get a damper from your instructor and measure the dimension for sides A-E as shown in the drawing. In what size fireplace would it work best?
2. Pass a quiz on selecting the proper size damper to use. You will be given the width of the fireplace in inches and you must decide what size damper to use. You must score at least 80%.
3. Attend a lecture/demonstration by your instructor on installing a damper. Take notes to make sure you know how to
 - a. Put the damper door together.
 - b. Put the door catch or stopper together.
 - c. Put the door handle together.
4. Use your notes from the lectures and the Performance Guide above and practice inserting a damper. Your instructor will give you the building specifications. Check with your instructor after each major step. When you are ready, ask for the Evaluation.

EVALUATION

You will be given the tools, supplies and blueprints you will need. Insert a damper. The damper when open must draw smoke.

STUDENT COMPETENCY SHEET

MODULE 12

Constructing Residential Chimneys and Fireplaces

COMPETENCY 05

Set flues.

PERFORMANCE GUIDE

1. Measure and cut flue according to specifications.
2. Spread mortar on top of last corbel in smoke chamber.
3. Set flue in mortar.
4. Cut off protruding mortar inside flue lining.
5. Build exterior back up walls of chimney to approximately 6 inches below the flue lining.
6. Spread mortar on top of first flue lining.
7. Set second flue lining in mortar directly over first flue lining.
8. Repeat step number three.
9. Continue this process until specified height is reached.

LEARNING ACTIVITIES

1. Read page 136-137 "Flues" in Bricklaying Skill and Practice. You will be quizzed on Table 7-1. You must score 100% on the quiz.
2. Attend a lecture/demonstration by your instructor on cutting a flue lining. Take notes to make sure you know:
 - a. how to measure and mark the flue lining.
 - b. use hammer and chisel to cut lining.
 - c. safety precautionsGet a piece of flue lining from your instructor.
3. Cut flue lining into three even pieces. You must observe all safety precaution. Check with your instructor after you make each cut.
4. Cut and set flues from blueprints. Use your notes and the Performance Guide above. Check with your instructor after each step. When you are ready, ask for the Evaluation.

EVALUATION

You will be given the tools, equipment and building specifications you will need. Set a flue. The bed joints must be smooth, free of holes, and sealed. Flues must be aligned evenly, and cut with no cracks or breaks in the lining.

STUDENT COMPETENCY SHEET

MODULE 12

Constructing Residential Chimneys and Fireplaces

COMPETENCY 06

Enclose heatilator.

PERFORMANCE GUIDE

1. Dry bond around heatilator and across the opening.
2. Lay bricks even with sides of heatilator opening and up to height of heatilator opening.
3. Secure bricks to heatilator.
4. Set lintel on top of masonry at height of opening.
5. Lay bricks on lintel across opening.
6. Continue to lay bricks around heatilator and across opening until desired height is reached.
7. Tool joints.

LEARNING ACTIVITIES

1. Attend a lecture by a sales representative on advantages and disadvantages of using heatilators. Prepare a report on why you would/would not use a heatilator. The report may be written or oral.
2. Attend a lecture/demonstration by your instructor on enclosing a heatilator. Take notes to make sure you know how to
 - a. secure bricks to heatilator
 - b. set lintel
 - c. safety precaution
 - d. blueprint specifications.
3. Observe masons enclosing heatilators on a construction site. Note any differences between the masons' way and your instructors' way of enclosing heatilators. Discuss the differences.

EVALUATION

In your own words, write the steps you must follow to enclose a heatilator. You may not use references.

STUDENT COMPETENCY SHEET

MODULE 12

Constructing Residential Chimneys and Fireplaces

COMPETENCY 07

Build a double face chimney (Smoke Chamber).

PERFORMANCE GUIDE

1. Re-establish original 8 inch wall above smoke shelf, approximately 8 inches back of damper.
2. Build an 8 inch wall straight up.
3. Corbel side walls evenly.
4. Corbel front walls to fit inside of flue lining.
5. Plaster smoothly underneath corbels.
6. Remove excess masonry materials around damper.

LEARNING ACTIVITIES

1. Read pages 154-155 "Chimney Construction" in Modern Masonry. You will be quizzed on the following information.

- a. When you can change a chimney's size or shape.
- b. Thickness of chimney walls.
- c. Spacing of joints when you have 2 flue linings.
- d. Minimum chimney heights above the roof.
- e. Flashing and counter flashing (kinds and purposes).

You must score 95% on the quiz.

2. Attend a lecture by your instructor on fire stops. Take notes so you know:

- a. the purpose of fire stops.
- b. how to read them on a blueprint.
- c. how to lay them.

3. Practice laying fire stops and smoke chamber of a chimney. Your instructor will give you the building specifications. Check with your instructor after each major step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the tools, building specifications and the equipment you will need. Build a smoke chamber. The corbeling must not exceed 1-1/2 inches per course. All joints must have full head joints.

STUDENT COMPETENCY SHEET

MODULE 12

Constructing Residential Chimneys and Fireplaces

COMPETENCY 08

Lay a mantel.

PERFORMANCE GUIDE

1. Lay out mantel according to given dimensions.
2. Dry bond bricks to given dimensions to establish necessary cuts.
3. Lay mantel to approximately 8 inches below damper.
4. Secure and set angle iron having at least 8 inch bearing.
5. Lay brick across angle iron to desired height.
6. Corbel as necessary for mantel shelf.

LEARNING ACTIVITIES

1. Read pages 146-147 in The Art of Bricklaying. Discuss the various combinations of material, designs, etc. you can use for a mantel.
2. Attend a lecture/demonstration by your instructor on laying a brick mantel. Take notes to make sure you know
 - a. how to read blueprint specifications
 - b. location of mantle
 - c. use of angle irons
3. Practice laying mantels. Your instructor will furnish you building specifications. Check with your instructor after each major step. When you are ready, ask your instructor for the Evaluation.

EVALUATION

You will be given the equipment, tools, supplies and building specifications you will need. Lay a mantel. Each corbel must not project more than 1 inch and each corbel course must be straight, level and plumb.